

**State of California
AIR RESOURCES BOARD**

**PUBLIC HEARING TO CONSIDER APPROVAL OF
THE SAN JOAQUIN VALLEY UNIFIED AIR POLLUTION CONTROL DISTRICT'S
TRIENNIAL PROGRESS REPORT AND PLAN REVISION 1995-1997
UNDER THE CALIFORNIA CLEAN AIR ACT**

STAFF REPORT

**Release Date: October 8, 1999
Hearing Date: October 28, 1999**

California Environmental Protection Agency



Air Resources Board

PUBLIC HEARING TO CONSIDER APPROVAL OF
THE SAN JOAQUIN VALLEY UNIFIED AIR POLLUTION CONTROL DISTRICT'S
TRIENNIAL PROGRESS REPORT AND PLAN REVISION 1995-1997
UNDER THE CALIFORNIA CLEAN AIR ACT

Hearing Date: October 28-29

Location

Air Resources Board
Board Hearing Room, Lower Level
2020 L Street
Sacramento, California

For questions or additional information, please contact:

Mr. Dean Saito, Manager, Liaison Section, at (916) 322-8279
or Ms. Tina Suarez-Murias, District Liaison, at (916) 323-1495

This report has been reviewed by the staff of the Air Resources Board and approved for publication. Approval does not signify that the contents necessarily reflect the views and policies of the Air Resources Board, nor does mention of trade names or commercial products constitute endorsement or recommendation for use. To obtain this document in an alternative format, please contact the Air Resources Board ADA Coordinator at (916) 322-4505, TDD (916) 324-9531, or (800) 700-8326 for TDD calls from outside the Sacramento area. This report is available for downloading from Air Resources Board's Internet site at <http://www.arb.ca.gov>.

TABLE OF CONTENTS

	Page
EXECUTIVE SUMMARY	1
I. BACKGROUND	2
A. Profile of the San Joaquin Valley	2
B. Adverse Effects of Air Pollution.....	3
C. Air Quality	5
D. Emissions of Ozone-Forming Gases	8
E. Pollutant Transport	10
F. Ozone Attainment Status	11
II. AIR QUALITY PLANNING	12
A. Requirements of the California Clean Air Act.....	13
B. Recent History of Ozone Plans in the San Joaquin Valley	15
III. EVALUATION OF PROGRESS AND ALL FEASIBLE MEASURES FOR STATIONARY SOURCES.....	16
A. Analysis of Required Air Quality Trends and Indicators for Ozone ..	16
B. Rulemaking Progress and Revisions to 1994 CCAA Plan Commitments.....	17
C. All Feasible Measures Review	21
IV. MOBILE SOURCE PROGRAMS	31
A. State and Federal Controls on Mobile Sources	31
B. Update to Statewide Mobile Source Control Strategy.....	35
C. Transportation Strategies.....	36
D. Funding Transportation and Motor Vehicle Emission Reduction Projects.....	40
V. ONGOING IMPROVEMENTS.....	44
A. Emission Inventory Workgroup.....	44
B. Central California Ozone Study	44
VI. STAFF RECOMMENDATIONS	46

EXECUTIVE SUMMARY

California's clean air plans and strategies are designed to ensure steady progress towards attainment of the health-based State and national ambient air quality standards. Control strategies implemented at the local, state, and federal level for stationary and mobile emission sources are needed to meet this challenge.

The San Joaquin Valley violates both the State and federal standards for ozone and particulate matter. Air pollution control programs have improved air quality from historic levels. However, Valley residents have not seen the dramatic reductions in ozone levels experienced in most other urban areas of California over the last decade.

This report presents the Air Resources Board (ARB or Board) staff's evaluation of the San Joaquin Valley Unified Air Pollution Control District's (District's) latest clean air plan for the State ozone standard – the California Clean Air Act (CCAA) Triennial Progress Report and Plan Revision for 1995-1997 (1997 Triennial Update). We compare the progress documented in this 1997 Update (and subsequent rulemaking) to the District's commitments in the 1994 CCAA Plan and the requirement that the Valley implement all feasible measures for stationary sources.

Since the San Joaquin Valley is also nonattainment for the federal one-hour ozone standard, the District adopted a State Implementation Plan (1994 Ozone SIP) along with the 1994 CCAA Plan. The comprehensive 1994 plan included commitments to adopt 17 measures needed to meet both federal and State ozone standards, plus an additional 16 measures needed only for the more protective State standard.

The District has made progress in adopting the commitments in the 1994 SIP and the 1994 CCAA plan that have significant emission reductions. The rules adopted or amended since 1994 will reduce ozone precursors by over 27 tons per day in the 2000-2001 timeframe. These reductions represent about 80 percent of the total commitment in the 1994 SIP for stationary source measures. However, a number of rules were not adopted as scheduled in the 1995-1997 planning cycle. It appears unlikely that such deficiencies will be completely corrected during this current planning cycle. Our analysis also identified several source categories that are currently subject to control at a level less than the all feasible measures requirement of the CCAA. The District will need to make steady progress to fulfill the remaining commitments and ensure that all feasible measures are in place.

We are recommending that the Board conditionally approve the 1997 Triennial Update for the San Joaquin Valley. The proposed conditions include: adoption of the remaining 1994 SIP commitments by the end of 2000; and prioritization and adoption of at least four additional measures per year in the next planning cycle (2001-2003) to achieve emission reductions. The list of additional measures is based on 1994 CCAA-only commitments and source categories where ARB has identified the current requirements as less than all feasible measures. These measures are also likely to be needed to demonstrate attainment of the federal one-hour ozone standard.

I. BACKGROUND

California's clean air plans and strategies are designed to ensure steady progress towards attainment of both state and federal health based air quality standards. While California's efforts to reduce air pollution have been immensely successful over the past 20 years, more needs to be done to achieve the public health goals reflected in our air quality standards. This report presents the Air Resources Board (ARB or Board) staff's evaluation of the San Joaquin Valley Unified Air Pollution Control District's (District) latest clean air plan – the California Clean Air Act Triennial Progress Report and Plan Revision 1995-1997 – adopted by the District Governing Board on December 17, 1998.

In Chapter I, we provide a brief discussion of the effects of air pollution and current air quality in the San Joaquin Valley. Chapter II includes an introduction to the requirements of the California Clean Air Act (CCAA) and the history of the District's clean air plans. The emphasis is on ozone since the CCAA does not require attainment plans for particulate matter and the San Joaquin Valley already attains standards for carbon monoxide, nitrogen dioxide, and sulfur dioxide. In Chapter III, we evaluate District's progress in meeting its responsibilities under the requirements of the CCAA. In Chapter IV, we review the regulatory and incentive programs that are reducing mobile source emissions in the San Joaquin Valley. In Chapter V, we summarize ongoing District and ARB research that is improving the technical foundation for future planning efforts in the San Joaquin Valley. Finally in Chapter VI, we present our recommendations to the Board.

A. Profile of the San Joaquin Valley

The San Joaquin Valley Unified Air Pollution Control District covers eight counties in the lower portion of California's Central Valley: San Joaquin, Stanislaus, Merced, Madera, Fresno, Kings, Tulare and western Kern. The District, which was unified in 1991, is the largest in geographic area within California, encompassing more than 25,000 square miles. The District's jurisdictional boundaries are identical to those of the San Joaquin Valley Air Basin. It is bounded on the west by the Coast Range, on the south by the Tehachapi Mountains, on the east by the Sierra Nevada, and by the Sacramento Valley to the north. While most of the District is a low, broad valley adjoining the Sacramento Valley to the north, the central and southern counties of the Valley extend through the foothills to the crest of the Sierra Nevada.

In 1997, the population of the San Joaquin Valley was about three million. A string of urbanized centers is found along Route 99 traversing the eastern side of the Valley. Population growth continues to be focused in the cities and towns of the northern region of the Valley and along the Route 99 corridor. A major transportation corridor, Interstate 5, runs along the sparsely populated western side of the Valley. Agriculture is the predominant land use in the Valley, taking advantage of a year-round growing season. Over 250 crops are farmed in the Valley, including grapes, nuts, cotton, and tomatoes. The croplands are interspersed with livestock grazing, dairy farms and

hayfields. Oil production activities are concentrated around Bakersfield in conjunction with oilfields found in the southern portion and southwestern side of the Valley.

The Valley has one of the most serious and complex ozone and particle pollution problems in the country. The wide diversity of pollution coupled with the projected population growth make air quality planning in the Valley a tremendous challenge.

B. Adverse Effects of Air Pollution

The primary driving force for California's air quality programs is the need to protect the public from exposure to harmful levels of air pollutants. Because of the significant agricultural industry in the San Joaquin Valley, the adverse effects of air pollution on vegetation is an economic issue as well. The following section provides a brief summary of the adverse health and welfare effects of air pollution, focusing on ozone, particulate matter, and carbon monoxide.

1. *Health Effects*

Ozone: Exposure to ozone can cause shortness of breath and respiratory problems, aggravation of asthma, chest pain, coughing and, over the long-term, even permanent lung damage. Ozone, or smog, is formed when reactive organic gases (ROG) or the subset of volatile organic compounds (VOC) and oxides of nitrogen (NOx) react in sunlight, making summer the peak ozone season. ROG and NOx are emitted from many sources, such as motor vehicles, solvents and coatings, and combustion processes. The State and federal air quality standards for ozone are presented in Table I-1.

**Table I-1
Ozone Ambient Air Quality Standards**

Averaging Time	California Standard (ppm)	Federal Standard (ppm)
1-Hour	0.09	0.12
8-Hour	-	0.08

Note: The new federal eight-hour standard is 0.08 ppm. The standard is being challenged in court and U.S. EPA is currently prohibited by a court decision from enforcing the standard. U.S. EPA plans to ultimately phase out the federal one-hour standard. However, areas like the San Joaquin Valley continue to be subject to the one-hour standard until attainment is achieved.

Particulate Matter: Exposure to inhalable particulate matter pollution is linked to increased frequency and severity of asthma attacks and bronchitis, and premature death in people with existing cardiac or respiratory disease. Particulate matter is a complex mix of pollutants, such as nitrates, sulfates, heavy metals, smoke, and dust. Inhalable particles can be directly emitted from sources like vehicles, fires, and dust from unpaved roads; or formed in the atmosphere by the reaction of precursors, like

NOx and ammonia. In the Valley, particle levels are highest during the fall and winter seasons. The State and federal air quality standards for particulate matter are presented in Table I-2.

**Table I-2
Particulate Matter Ambient Air Quality Standards**

Pollutant	Averaging Time	California Standard (ug/m³)	Federal Standard (ug/m³)
PM10	24-Hour	50	150
	Annual Geometric Mean	30	-
	Annual Arithmetic Mean	-	50
PM2.5	24-Hour	No Separate State Standards	65
	Annual Arithmetic Mean		15

Note: The new federal PM2.5 standards are 65 ug/m³ for the 24-hour standard and 15 ug/m³ for the annual standard. Both standards are being challenged in court.

Carbon Monoxide: Carbon monoxide deprives the body of oxygen, affecting the respiratory and central nervous systems. Carbon monoxide exposure may contribute to cardiovascular disease. Ambient levels of carbon monoxide pollution peak in winter. Carbon monoxide is directly emitted from motor vehicles and, to a lesser extent, from stationary combustion sources. The State and federal air quality standards for carbon monoxide are presented in Table I-3.

**Table I-3
Carbon Monoxide Ambient Air Quality Standards**

Averaging Time	California Standard (ppm)	Federal Standard (ppm)
1-Hour	20	35
8-Hour	9	9

2. *Effects of Ozone on Vegetation*

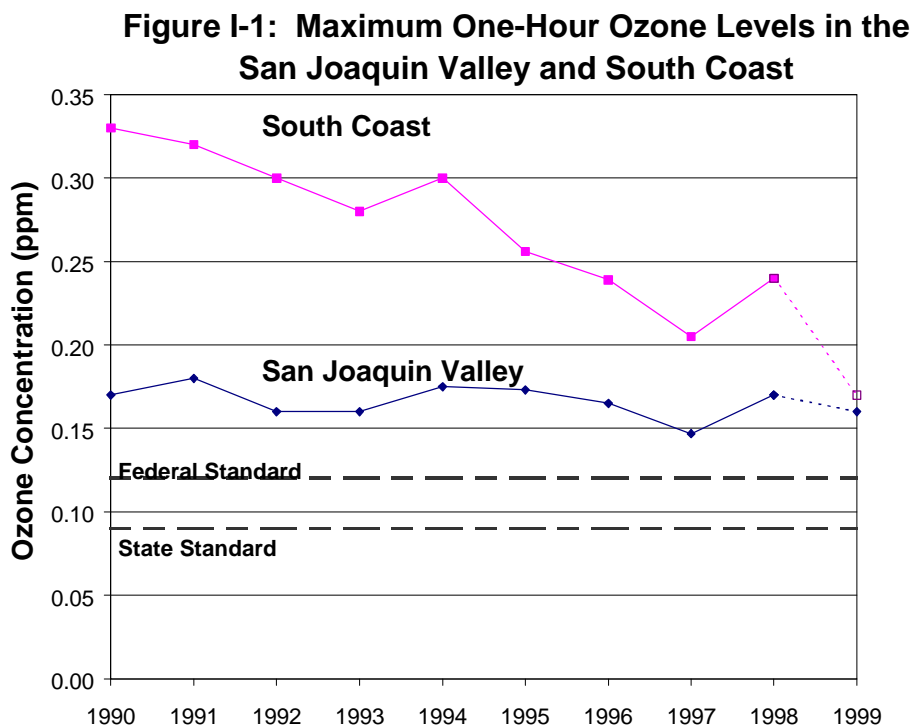
Research studies have shown that a number of important crops in the Valley's economy produce less yield, mature slowly or suffer tissue damage when grown in smoggy conditions. Ozone adversely affects sensitive plants, including citrus fruits, tomatoes, cotton, potatoes, beans, and lettuce by diminishing their photosynthetic ability and growth. Sugar production in grapes lessens as ozone levels increase. Ozone also reduces carbohydrate levels in grasses significantly, diminishing their value for grazing. Ozone is also known to damage the trees of California's forests. By compromising plant vigor, elevated ozone levels can reduce a crop yield and increase plant susceptibility to disease and insect attack. As a result, efforts to reduce ozone levels in the Valley are important to agricultural productivity.

C. Air Quality

While this report focuses on the District's plan to reduce ozone pollution, we are providing a broader summary of air quality in the San Joaquin Valley. The following sections cover ozone, particulate matter, and carbon monoxide air quality trends since 1990.

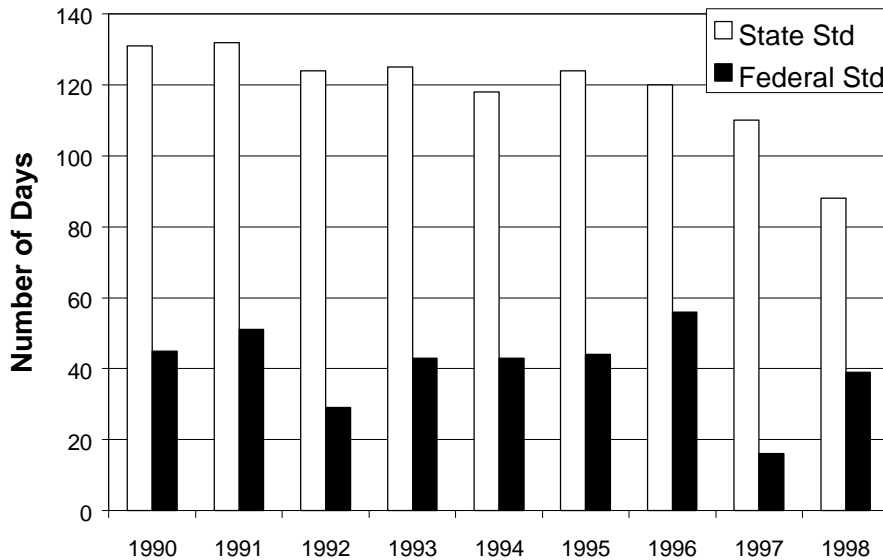
1. **Ozone**

Peak ozone levels in the San Joaquin Valley (along with those in the South Coast for comparison) are shown in Figure I-1. Unlike other regions of California, the San Joaquin Valley has not seen the steady, often dramatic decline in ozone levels in recent years. In fact, there has not been much change in the peak levels in the Valley since 1990. While ozone levels in the South Coast were much higher than those in the Valley at the beginning of the decade, preliminary data through August 1999 indicate that peak ozone levels in the two areas are similar for this year.



The Valley still records numerous exceedances of both the federal and State ozone standards as shown in Figure I-2. There have been fewer violations of the State ozone standard in recent years than in the beginning of the decade. However, the standard is still violated on average about 100 days a year. Ozone levels need to be substantially reduced before the Valley can meet either the federal or State ozone standard.

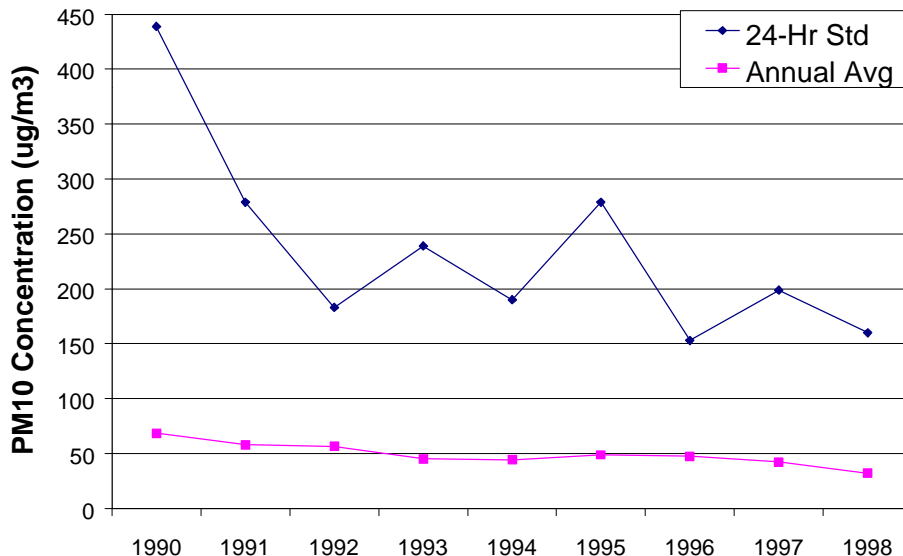
Figure I-2
Days Over State and Federal One-Hour Ozone Standard
in the San Joaquin Valley



2. *Inhalable Particulate Matter*

Peak levels and annual average concentrations of inhalable particulate matter less than 10 microns (PM₁₀) in the Valley have declined since 1990, as shown in Figure I-3. PM₁₀ levels have been declining statewide as emissions of PM₁₀ precursors such as NO_x, ROG, and oxides of sulfur decreased significantly. However, favorable weather conditions in recent years have also favored lower PM₁₀ levels. In general, years with

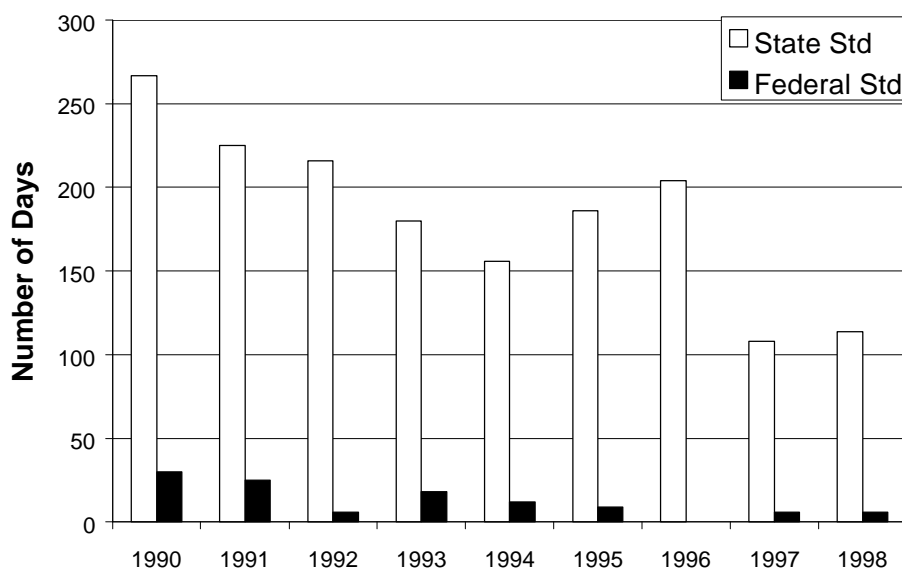
Figure I-3
Maximum 24-Hour and Annual PM₁₀ Concentrations in
the San Joaquin Valley



more rainfall often have lower PM10 levels. While PM10 air quality has improved, the Valley still violates both the State and federal air quality standards for PM10. Peak 24-hour and annual PM10 levels remain well above the State PM10 standards.

The number of days exceeding the PM10 standards in the Valley is displayed in Figure I-4. Because PM10 concentrations are routinely monitored only once every six days, the number of exceedances is a calculated value; it is the number of exceedances expected to occur if PM10 were monitored daily. The State 24-hour PM10 standard is exceeded about 100 days a year, while the less health-protective federal PM10 standard is exceeded about six times a year.

Figure I-4
Days Over State and Federal 24-Hour PM10 Standard in
the San Joaquin Valley

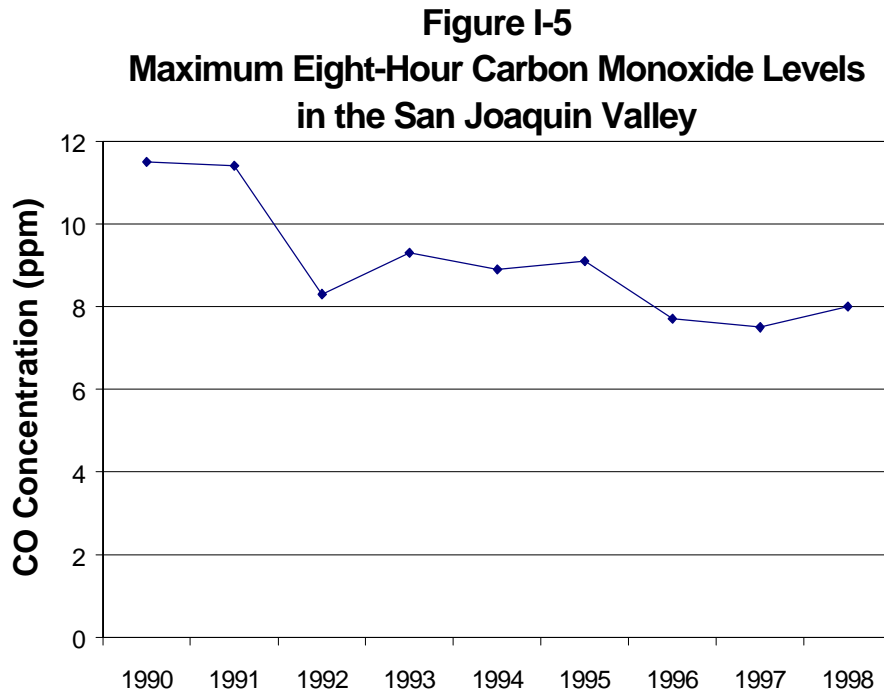


In 1997, U.S. EPA promulgated air quality standards for the fine fraction of particulate matter – particles 2.5 microns or less (PM2.5). These new standards are currently being challenged in court; however we expect them to be implemented in the future. U.S. EPA will not designate nonattainment areas for the PM2.5 standards until at least 2002. Based on the most recent air quality data, we expect the Valley to violate the recently promulgated PM2.5 standards.

3. Carbon Monoxide

Carbon monoxide air quality has improved dramatically in the San Joaquin Valley and the rest of California due to cleaner vehicles and fuels. In fact, the Valley now attains both the State and federal air quality standards for carbon monoxide. It has not recorded an exceedance of the State standard since 1995, and it has not recorded an exceedance of the federal standard since 1992. Carbon monoxide air quality trends for

the Valley are displayed in Figure I-5. We expect the continued turnover of the fleet to cleaner vehicles will ensure further air quality improvement in the future, even with substantial growth.



D. Emissions of Ozone-Forming Gases

Emission inventories provide an accounting of the sources that contribute to air pollution. This section focuses on the San Joaquin Valley's emission inventory for ozone precursors – ROG and NO_x.

Figures I-6 and I-7 present the Valley's 1998 inventory, as well as the projected 2010 inventory for ROG and NO_x, using the current emissions models and reflecting adopted (but not planned) controls. In these figures, emissions are classified into four major source categories – on-road mobile sources (such as cars, trucks, and buses), off-road mobile sources (such as farm and construction equipment, lawn and garden equipment, and locomotives), stationary sources (such as industrial facilities, refineries, and power plants), and area-wide sources (such as service stations, consumer products, and pesticides).

State and local programs have substantially reduced ozone precursor emissions for both ROG and NO_x. As the figures illustrate, these reductions will continue over the next decade as newer, cleaner mobile sources replace the existing fleet and as adopted stationary and area source control measures become fully implemented.

Based on the current models, stationary and area sources account for about half of the total ozone precursor emissions in 1998; mobile sources contribute the other half. Our inventory projections show a different mix in 2010. The total inventories for ROG and NOx will be reduced in 2010. The mobile source inventory for both pollutants declines while the stationary and area source emissions hold steady or increase.

Fig. I-6: ROG Emissions Trend in the San Joaquin Valley

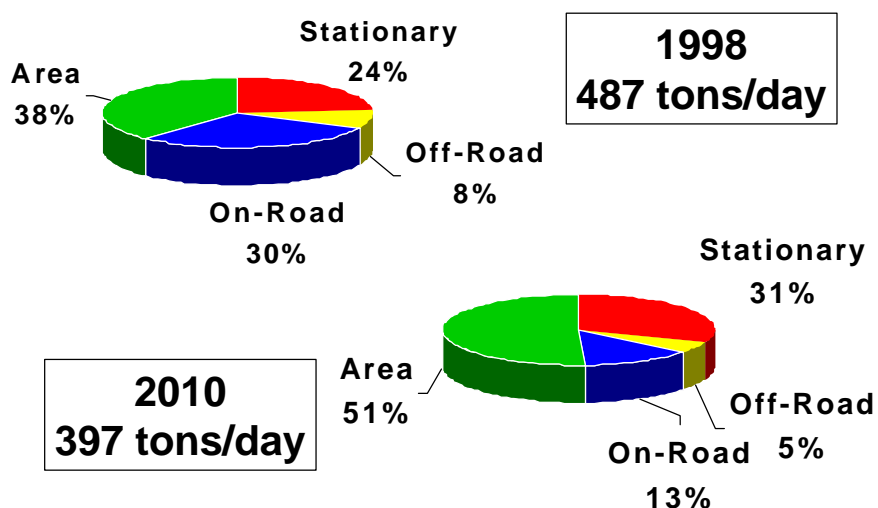
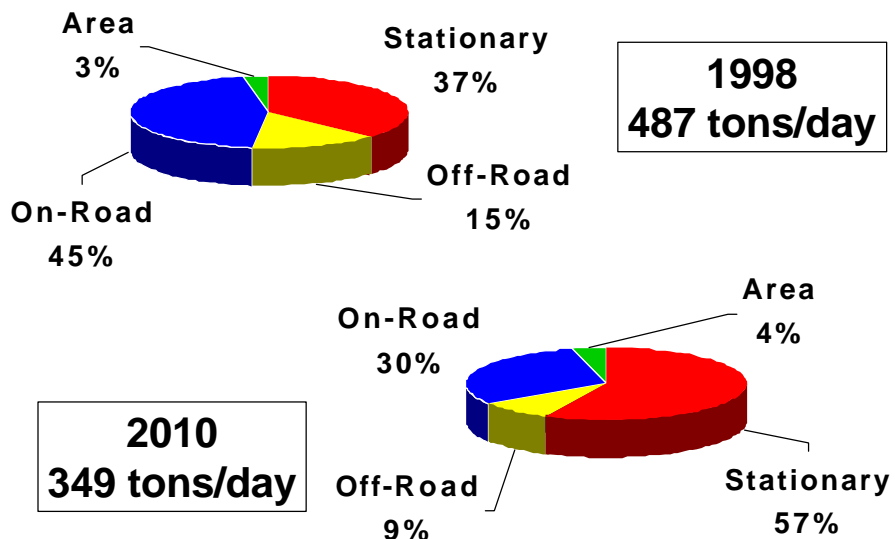


Fig. I-7: NOx Emissions Trend in the San Joaquin Valley



It is important to note that upcoming improvements to the emissions models for on-road and off-road equipment are expected to significantly increase the ROG, NO_x and CO emissions estimates. However, the pattern of steady decline in mobile emissions and minimal change in stationary/area emissions shown on the charts will persist.

E. Pollutant Transport

Every three years, ARB reviews ambient air monitoring data and meteorology to determine whether transport is occurring between air basins and to what degree pollutants from upwind basins affect the ozone levels in the downwind basins. The relative contribution of pollution from an upwind area to downwind area is particular to the exceedance event and depends on parameters such as wind speed, wind direction, and source operations. Table I-4 shows ARB's most recent analysis of the transport couples that include the San Joaquin Valley Air Basin, published in 1996.

**Table I-4
Transport Couples Involving San Joaquin Valley Air Basin (1996)**

Upwind Air Basin	Downwind Air Basin
Bay Area	San Joaquin Valley
Broader Sacramento Area	San Joaquin Valley
San Joaquin Valley	Broader Sacramento Area
San Joaquin Valley	Mountain Counties
San Joaquin Valley	Great Basin Valleys
San Joaquin Valley	Mojave Desert
San Joaquin Valley	South Central Coast
San Joaquin Valley	North Central Coast

The San Joaquin Valley both imports and exports ozone and its precursors. Although transport from the Bay Area and Sacramento contributes to ozone levels in the San Joaquin Valley on some days, this transport is not the sole reason for exceedances of the State standard in the Valley. A majority of the exceedances in the Valley are jointly caused by transport from outside the District and from ozone precursors generated by sources within the District. Transport from the San Joaquin Valley also affects ozone levels in six air basins downwind of the District.

Under the CCAA, the San Joaquin Valley and its upwind neighbors (Bay Area, Broader Sacramento) must apply the best available retrofit control technology to existing permitted stationary sources to reduce ozone levels in both the area of origin and the downwind region.

F. Ozone Attainment Status

As mentioned previously, air quality in the San Joaquin Valley violates both the State and federal one-hour ozone standards. Accordingly, the region is designated nonattainment for both. Under the CCAA, the San Joaquin Valley is classified as severe nonattainment area, and the District is required to reduce emissions as expeditiously as possible to meet the State ozone standard.

By comparison, the U.S. Environmental Protection Agency (U.S. EPA) classifies the San Joaquin Valley as a serious nonattainment area for the federal ozone standard. As a serious area, the Valley must attain the standard by November 1999. However, based on current air quality, the Valley will miss its 1999 attainment deadline. Since the area has violated the standard this year, it is not eligible for an extension of the attainment date. Instead, U.S. EPA has stated its intent to bump-up the region to a severe classification. The attainment date for severe areas is 2005.

If the District is bumped-up, it would need to revise its State Implementation Plan (SIP) to incorporate the additional requirements associated with the severe classification, including a more stringent program for new sources. This revised SIP would need to include additional control measures sufficient to continue progress and demonstrate attainment by 2005. The revised SIP would likely be due in the 2001 timeframe. The District's planning efforts for the State ozone standard will provide a good foundation for the SIP revision.

II. AIR QUALITY PLANNING

The goal of California's air quality planning process is to prepare, adopt, and implement plans to attain the health-based State and national ambient air quality standards. The local air pollution control and air quality management districts (districts) in California that do not meet the health standards are responsible for developing local plans and strategies to control emissions from most stationary and area sources. Although ARB and U.S. EPA have primary responsibility for controlling emissions from mobile sources, the air districts and transportation agencies are also developing programs to reduce transportation demand and minimize emissions. ARB reviews and approves the local air district plans, and develops the statewide element for clean air plans.

The 1988 California Clean Air Act (CCAA) and the 1990 amendments to the federal Clean Air Act (FCAA) lay the foundation for our current air quality planning efforts in California. These two laws required that air quality plans be developed for nonattainment areas and spurred two major planning processes in California.

The CCAA clearly spelled out in statute the State's air quality goals, planning mechanisms, regulatory strategies, and standards of progress. The goal of the CCAA is for all of the areas of California that are not attaining State standards to reach those standards by the earliest practicable date and to meet interim progress requirements. The CCAA does not set deadlines for attaining standards or impose penalties for noncompliance; instead, it is performance-based with requirements reflecting the severity of a region's air quality problem.

The CCAA requires districts to prepare air quality plans showing the strategies for progress and attainment of the State standards for ozone, carbon monoxide, sulfur dioxide, and nitrogen dioxide. (The San Joaquin Valley Air Basin is presently in attainment for carbon monoxide, nitrogen dioxide and sulfur dioxide standards.) The initial plans for ozone were due in 1991, with updates every three years thereafter. ARB has deferred the attainment demonstration for the State ozone standard thus far -- we expect to reestablish this requirement for the 2003 plan revisions when the results of recent and planned technical studies are available.

The FCAA established a parallel goal -- steady progress toward attainment of the national ambient air quality standards, through the strategies defined in the State Implementation Plan (SIP). Unlike the State Act, Congress set explicit deadlines for attainment in the federal Act, based on the severity of the pollution problem in an area. Only the federal law contains provisions for sanctions if a state fails to satisfy its planning and control requirements. For ozone, the FCAA required the preparation and submittal of a comprehensive attainment plan by November 15, 1994 for six areas of California, including the San Joaquin Valley. Building on the local elements developed by the affected air districts, ARB adopted and submitted the 1994 California SIP for Ozone by the statutory deadline. U.S. EPA approved this plan in 1996. For particulate matter, the FCAA required a comprehensive PM10 attainment plan in 1997 for four

areas in California, including the San Joaquin Valley. The San Joaquin Valley's PM10 SIP has been submitted, but not yet approved by U.S. EPA.

A. Requirements of the California Clean Air Act

This section describes the specific requirements of the California Clean Air Act for ozone nonattainment areas against which the San Joaquin Valley's 1997 Triennial Update must be evaluated.

Under the CCAA, ARB classifies ozone nonattainment areas as 'moderate', 'serious', 'severe', or 'extreme' based on the margin by which the standard is exceeded and the source of the pollution. Some requirements vary with classification, which ensures that areas with more difficult air quality problems have more comprehensive air quality plans.

1. *General Provisions*

State plans were first due in 1991, with updates due in 1994 and every three years thereafter. In these updates, air districts must report progress against their plans both in terms of actual emission reductions and measured air quality. Triennial updates also are to reflect new information, such as changes in emission inventories and population growth.

Under the CCAA, each district's attainment plan is to achieve a five percent per year reduction in each nonattainment pollutant or its precursors in order to reach attainment. A district may use a control strategy that achieves less than five percent annual reductions, if all feasible measures are included in the plan with an expeditious adoption schedule (Health and Safety Code (HSC) section 40914.)

Because of substantial emission reductions achieved in the twenty or so years of air pollution control regulation before the CCAA was enacted, no 1991 district plan was able to demonstrate a five percent reduction annually for the current or future planning cycles. Accordingly, every district opted for complying with the "all feasible measures" approach. The review in this staff report focuses on whether the 1997 Triennial Update incorporated all feasible measures and on the District's progress in adopting these measures.

The 1997 Triennial Update does not envision attainment of the State ozone standard within the plan's time horizon of 2000. Accordingly, an attainment demonstration for the State ozone standard has been deferred to a future plan update.

In addition to the initial 1991 plans, districts must also prepare and submit to ARB the following reports and plan revisions:

Annual Progress Report. Before the end of each year, each district is to prepare and submit a report to ARB summarizing its progress in meeting the schedules for adopting and implementing the control measures in the district's CCAA plan. The reports are to contain, at a minimum, the proposed and actual dates for the adoption and implementation of each measure (HSC section 40924(a)).

Triennial Progress Report. Before the end of 1994, and once every three years thereafter, each district is to assess its progress toward attainment of the State standards. Each triennial report is to be incorporated into the district's triennial plan revision prepared pursuant to HSC section 40925. Each triennial progress report shall contain, at a minimum, both of the following: 1) the extent of air quality improvement achieved during the preceding three years, based upon ambient pollutant measurements, best available modeling techniques, and air quality indicators identified by ARB pursuant to HSC section 39607(f); and 2) the expected and revised emission reductions for each measure scheduled for adoption in the preceding three-year period (HSC section 40924(b)).

Triennial Plan Revision. HSC section 40925(a) requires a revision to district plans at least every three years to correct any deficiencies and to incorporate new data or forecasts. Before the end of 1994, and once every three years thereafter, each district is to review and revise its attainment plan to: 1) correct for deficiencies in meeting the interim rates of progress incorporated into the plan pursuant to HSC section 40914; and 2) to incorporate new data or projections into the plan. These new data or projections include, but are not limited to, the quantity of emission reductions actually achieved in the preceding three-year period, and the rates of population-related, industry-related, and vehicle-related growth actually experienced in the district and projected for the future. Upon adoption of each triennial plan revision at a public hearing, the district board is to submit the plan revision to ARB (HSC section 40925(a)).

A district may modify the emission reduction strategy for subsequent years based on this triennial review, if the district demonstrates to ARB, and ARB finds, that the modified strategy is at least as effective in improving air quality as the strategy which is being replaced (HSC section 40925(b)).

2. Additional Requirements for Severe Ozone Nonattainment Areas

Since the San Joaquin Valley is classified as a severe nonattainment area for the State ozone standard, additional provisions apply. The District must address the following requirements, either in its already-adopted rules and regulations, or in its attainment plan (HSC section 40920.)

Overall Population Exposure. To minimize health impacts, the District's control measures and programs must be sufficient to reduce overall population exposure to ambient pollutant levels in excess of the standard by at least 25 percent by December 31, 1994; 40 percent by December 31, 1997; and 50 percent by December 31, 2000, based on average per capita exposure and the severity of the

exposure. The average level of exposure experienced during the 1986 through 1988 period is the baseline.

Best Available Retrofit Control Technology (BARCT). Severe nonattainment areas are required to use best available retrofit control technology (BARCT) for all existing permitted stationary sources of ozone precursors, VOC and NOx. BARCT is defined in HSC section 40406 as an emission limitation that is based on the maximum degree of reduction achievable, taking into account environmental, energy, and economic impacts by each class or category of source.

Transport Mitigation. The San Joaquin Valley Air Basin has been identified by ARB as an upwind source of pollution in multiple downwind areas. As a result, the District must apply BARCT to all permitted stationary sources as expeditiously as practicable, reinforcing the BARCT requirement that already applies to severe areas.

Reasonably Available Transportation Control Measures (TCMs). Severe areas must use reasonably available TCMs sufficient to substantially reduce the rate of increase in passenger vehicle trips and miles traveled per trip.

B. Recent History of Ozone Plans in the San Joaquin Valley

In accordance with the CCAA, the newly formed Unified District prepared an air quality plan in 1991 for the San Joaquin Valley Air Basin (1991 CCAA Plan). ARB conditionally approved the 1991 CCAA Plan on August, 27 1992. The 1991 CCAA Plan identified potential new rules and amendments to the District's existing rule base, then prioritized their development and adoption starting with measures expected to generate the greatest emission reductions.

The District adopted its first triennial progress report and plan revision (1994 CCAA Plan) on November 14, 1994. It was developed in conjunction with the 1994 Ozone SIP for the San Joaquin Valley. The federal and state components were combined into a single document entitled the Ozone Attainment Demonstration Plan. The 1994 CCAA Plan appeared as Chapter 8 of this document.

On December 17, 1998, the District adopted the second triennial progress report and plan revision covering the period from 1995-1997 (1997 Triennial Update). The 1997 Triennial Update is the subject of this review.

III. EVALUATION OF PROGRESS AND ALL FEASIBLE MEASURES FOR STATIONARY SOURCES

This chapter evaluates the District's progress in meeting its responsibilities under the requirements of the CCAA, based on the 1997 Triennial Update and rulemaking through September 1999. The first section analyzes the required air quality trends and indicators for the San Joaquin Valley, based on air monitoring data. The next section evaluates the District's progress in adopting control measures to fulfill its rulemaking commitments in the 1994 CCAA plan, and describes the changes made via the 1997 Triennial Update. The final section assesses the District's compliance with the all feasible measures provision of the CCAA and summarizes our analysis of the District's actions to control stationary sources, along with priorities for future rulemaking.

While the District's primary responsibility is regulating non-mobile sources, it also develops and implements transportation control measures to help further reduce emissions from mobile sources. Chapter IV describes the progress made by air agencies and transportation planning organizations in reducing emissions from mobile sources.

A. Analysis of Required Air Quality Trends and Indicators for Ozone

Tracking changes in ambient air quality over time is a direct way of observing progress towards meeting the State standards. As shown in Table III-1, the most recent ambient monitoring data for the San Joaquin Valley Air Basin indicate a decreasing number of days on which both federal and State ozone standards are exceeded. However, the maximum ozone concentration on those days is still significantly above the State standard of 0.09 ppm. Although the basin maximum has decreased somewhat since the baseline year for the State standard (1987), it has not improved significantly since 1990. Since the adoption of the 1991 CCAA Plan, the Expected Peak Day Concentration (the statistic identified by ARB to assess attainment under the CCAA) has remained steady, at about 0.16 - 0.17 ppm.

In the 1997 Triennial Update, the District explained that overall population exposure to ambient ozone levels has been reduced with statistical certainty by 25 percent in the decade since 1987. Table III-1 indicates that while statistical population exposure to unhealthy levels of ozone above the State standard in the San Joaquin Valley decreased measurably from the late 1980's, the rate of reduction slowed in the 1990s. During the 1990s, the District population has grown continually, at a rate of at least two percent per year. Because of this growth, there are more people exposed to the unhealthy ozone levels, despite the fact that exceedances occur less frequently than they did in the late 1980s.

Table III-1
Summary of Ozone Air Quality and Indicators in the San Joaquin Valley Air Basin
(1990-1998)

Year	Days Over Standard		Basin Maximum (ppm)	Expected Peak Day Concentration (ppm)	Population-weighted exposure (3-yr. avg.) (pphm-hrs)	Area-weighted exposure (3-yr. avg.) (pphm-hrs)
	State 1-Hour	Federal 1-Hour				
1987 baseline	151	64	0.200	0.172	370.7	473.4
1990	131	45	0.170	0.164	175.2	206.3
1991	132	51	0.180	0.167	154.1	168.3
1992	124	29	0.160	0.162	174.1	187.7
1993	125	43	0.160	0.162	146.4	174.2
1994	118	43	0.175	0.156	161.1	204.9
1995	124	44	0.173	0.164	178.3	226.3
1996	120	56	0.165	0.164	152.6	195.5
1997	110	16	0.147	0.167	148.7	233.1
1998	88	39	0.170	0.162	--	--

Population-weighted exposure is a statistical estimate of outdoor exposure for the average person living in the San Joaquin Valley. Area-weighted exposure is a statistical measure of exposure in an average square kilometer of the Valley. The two measures do not always trend alike due to differences in population densities, location of emission sources, and meteorological patterns over the entire San Joaquin Valley Air Basin. Both the population- and area-weighted exposure measurements are lower today than they were in 1987. However, in the 1990s, progress in reducing the typical person's exposure to unhealthful ozone levels has been slow as evidenced by the population-weighted exposure values. The area-weighted exposure values have fluctuated in the 1990s without consistent improvement.

Given the continuing increase in population, new emission reductions will be needed to assure the population-weighted exposure in 2000 is 50 percent lower than the 1987 levels, as required by the CCAA.

B. Rulemaking Progress and Revisions to 1994 CCAA Commitments

In this section, we examine the rulemaking progress made on the District's commitments in the 1994 CCAA and revisions to those commitments contained in the 1997 Triennial Update. For each commitment, we compare the planned versus actual adoption and implementation dates, as well as the planned and actual emission reductions. In the 1994 CCAA, the seventeen new rules or rule amendments (including transportation control measures) scheduled for adoption within the 1994-1996

timeframe were also identified as District commitments in the 1994 Ozone SIP (SIP measures).

The SIP measures, together with another sixteen CCAA-only control measures identified by a "post-1996" adoption date, are intended to satisfy the "all feasible measures" requirement of the CCAA. The District strategy is to first adopt measures achieving the greatest emission reductions to meet federal SIP commitments, and then to consider additional measures needed to meet the State ozone standard and CCAA requirements. We expect that many of the current CCAA-only commitments will need to be added to the Ozone SIP in 2001 when the District submits a revised SIP as part of the bump-up to a severe nonattainment area for the federal one-hour ozone standard.

1. *Progress on 1994 CCAA Plan Commitments*

Table III-2 (SIP and CCAA measures) and Table III-3 (CCAA-only measures) illustrates the District's rulemaking progress from 1995 through September 1999. Table III-2 shows total emission reductions of 13.94 tpd VOC and 27.52 tpd NO_x from the 1994 CCAA Plan commitments that were also included in the 1994 SIP (albeit with a different level of emission reductions). Table III-3 shows total emission reductions of 1.85 tpd VOC and 0.17 tpd NO_x from additional 1994 CCAA Plan commitments. As a result, the District's total obligation under the 1994 CCAA Plan is 15.79 tpd VOC and 27.69 tpd NO_x.

The District adopted eight SIP measures in this timeframe which will achieve over 27 tpd of reductions. The bulk of the reductions achieved to date are from Rule 4701 (Stationary and Portable Piston Engines). This rule will achieve greater reductions than anticipated in either the 1994 SIP or the 1994 CCAA Plan due to an increase in the emission inventory (about 10 percent) and more effective control requirements. Only five measures were adopted during the 1995-1997 state triennial planning cycle, with three additional rules adopted since then. Delays in adoption have also resulted in delays in implementation for several of the SIP measures. If a measure has not yet been adopted, we also show the new adoption and implementation dates from the 1997 Triennial Update.

2. *Revisions to CCAA Commitments in 1997 Triennial Update*

The 1997 Triennial Update delays the adoption and implementation dates of all the control measures not yet adopted. The 1994 SIP commitments are still the first priority. The remaining SIP measures are now scheduled for adoption by year-end 2000. In addition, an amendment to clarify the applicability of Rule 4661 (Organic Solvents) is set for adoption this year to avoid federal sanctions in August 2000. Rule 4661 establishes VOC limits for sources which use organic solvents, but exempts those sources covered by other District source specific rules. U.S. EPA's limited disapproval of Rule 4661 is based on its lack of specificity regarding exempt sources. Half of the remaining CCAA-only measures have been delayed to the next planning cycle, 2001-2003. The remaining CCAA-only commitments have been delayed beyond the next planning cycle into the 2004-2006 timeframe. Our recommendations for addressing the delays are discussed below in "Priorities for Future District Rulemaking."

Table III-2
Rulemaking Progress on 1994 CCAA Plan Commitments
--- New Measures Relied Upon in BOTH 1994 OZONE SIP AND 1994 CCAA PLAN ---

Rule #	Control Measure (Proposed New Measures are shown with parenthesis on the rule number)	Status	Adoption Date		Implementation Date		Projected Reductions* (tpd in 1999)			Actual Reductions (tpd in 1999 unless noted)
			1994 Plan	Actual or 1997 Plan	1994 Plan	Actual or 1997 Plan	Pollutant	1994 SIP	1994 CCAA Plan	
4601	Architectural Coatings		1Q/96	<i>Delayed</i> 4Q/99	1Q/98	<i>Delayed</i> 4Q/02	VOC	1.51	1.21	--
(4692)	Commercial Charbroiling		2Q/96	<i>Delayed</i> 2Q/00	2Q/98	<i>Delayed</i> 2Q/02	VOC	0.39	0.39	--
4354	Glass Melting Furnaces	✓	1Q/96	4/16/98	4Q/99	01/01/99	NOx	2.87	2.87	2.83
4607	Graphic Arts	✓	4Q/95	9/17/97	4Q/97	9/14/00	VOC	0.84	0.67	0.84 (2000)
4642	Landfill Gas Control	✓	1Q/95	7/20/95	4Q/99	1998	VOC	1.41	2.75	0.28
(4412)	Oil Well Drilling Rigs		2Q/96	Dropped	2Q/98		VOC	0.87	0.88	--
4623	Organic Liquid Storage		3Q/96	<i>Delayed</i> 4Q/00	3Q/98	<i>Delayed</i> 4Q/02	VOC	3.0	3.0*	--
4662	Organic Solvent Degreasing Operations		1Q/96	<i>Delayed</i> 2Q/99	1Q/98	<i>Delayed</i> 2Q/01	VOC	2.44	1.95	--
(4663)	Organic Solvent Waste		2Q/96	<i>Delayed</i> 2Q/99	2Q/98	<i>Delayed</i> 2Q/01	VOC	0.19	0.13	--
4305 (4306)	Smaller Boilers, Process Heaters, Steam Generators.	✓	3Q/95	12/19/96	3Q/99	5/31/01	NOx	7.6	7.6	0.55 (2001)
(4611)	Smaller Printing Operations (combined with rule 4607)	✓	4Q/95	9/17/97	4Q/97	9/14/00	VOC	0.30	0.31	0.31 (2000)
4701 (4702)	Stationary & Portable Piston Engines (renamed 4701)	✓	2Q/95	12/19/96	4Q/99	5/31/01	NOx	12.44	15.55*	22.3 (2001)
4621	Gas Transfer into Stationary Storage Tanks	✓	2Q/96	6/18/98	2Q/98	5/31/99	VOC	0.41	0.11	0.40
4622	Gas Transfer into Vehicle Fuel Tanks	✓	2Q/96	6/18/98	2Q/98	5/31/99	VOC		0.17	
4103	Agricultural Waste Burning		4Q/96	<i>Delayed</i> 4Q/00	1Q/97	<i>Delayed</i> Post 2002		---	---	--
(4411)	Well Cellars		2Q/96	<i>Delayed</i> 4Q/00	2Q/98	<i>Delayed</i> 4Q/02	VOC	0.56	0.57	--
	Transportation Control Measures	ongoing	ongoing	Some measures dropped	ongoing	ongoing	VOC NOx	1.8 1.5	1.8 1.5	ongoing
	TOTAL						VOC NOx	13.72 24.41	13.94** 27.52**	1.83 by 2001 25.68 by 2001

*In 1994, reductions from the application of Rule 4701 to westside sources were not included in the 1994 Ozone SIP. For Rule 4623, we adjusted the number shown to account for only the new reductions expected from the amendment. Other discrepancies are typing or rounding errors.

**Total emission reduction commitments for the 1994 CCAA Plan measures overlap with those of the 1994 SIP.

Table III-3
Rulemaking Progress on 1994 CCAA Plan Commitments
--- New Measures Relied Upon in the 1994 CCAA PLAN ONLY ---

Rule #	Control Measure	Adoption Date		Implementation Date		Projected Reductions (tpd)		
		1994 CCAA Plan	1997 Triennial Update	1994 CCAA Plan	1997 Triennial Update	Pollutant	1994 CCAA Plan	1997 Triennial Update
4661	Organic Solvents	Post 1996	2Q/99	Post 1998	2Q/01	---	---	---
(4307)	Driers (will amend 4305 as Phase 4 BARCT)	1Q/96	2004-2006	1Q/98	2006	---	---	---
(4308)	Asphalt Batch Plants	Post 1996	2001-2003	Post 1998	2003	NOx	0.03	0.03
(4408)	Oil Pipeline Pumping Fugitives	Post 1996	2001-2003	Post 1998	2003	---	---	---
(4409)	Discharge of Produced Oil/Flashing Losses	Post 1996	2001-2003	Post 1998	2003	---	---	---
(4410)	Gas Plant Glycol Regenerators	Post 1996	2001-2003	Post 1998	2003	---	---	---
(4501/4551)	Marine Vessel Operations	Post 1996	2004-2006	Post 1998	2006	---	---	---
(4502/4552)	Marine Vessel Loading Operations	Post 1996	2004-2006	Post 1998	2006	---	---	---
(4608)	Plastic Parts Coating Operations	Post 1996	2004-2006	Post 1998	2006	VOC	0.00	0.00
4625	Waste water Separators	Post 1996	2004-2006	Post 1998	2006	VOC	0.05	0.05
(4626)	Aircraft Fuel Storage and Refueling	Post 1996	2004-2006	Post 1998	2006	VOC	0.03	0.03
(4627)	Tank Cleaning and Venting	Post 1996	2001-2003	Post 1998	2003	---	---	---
(4643)	Publicly Owned Water Treatment Works	Post 1996	2001-2003	Post 1998	2003	---	---	---
4652	Coatings and Ink Manufacturing	Post 1996	2004-2006	Post 1998	2006	---	---	---
(4671)	Perchloroethylene Dry Cleaning	Post 1996	<i>DROPPED</i>	Post 1998	<i>DROPPED</i>	VOC	1.77	---
(4903)	Residential and Commercial Space Heaters	Post 1996	2001-2003	Post 1998	2003	NOx	0.14	0.14
TOTAL						VOC NOx	1.85 0.17	0.08 0.17

In the 1997 Triennial Update, the District continues its commitment to implement "all feasible measures" to achieve the State ozone standard and to adopt new rules or amendments giving first priority to those with the greatest emission reductions. The District continues to look for opportunities to obtain emission reductions by improving its inventory, comparing other districts' rules, tracking the development of ARB's suggested control measures and regulatory programs, and refining past control measure commitments.

From this ongoing review, the District has dropped two 1994 CCAA Plan measures that are also 1994 SIP commitments. The District eliminated proposed Rule 4412 for Oil Well Drilling and Workover Rig Piston Engines, because it determined that a statewide ARB program for registering portable equipment will achieve the same purpose. It should be noted that the statewide registry program is a voluntary program. The District may want to reconsider proposed Rule 4412 in the future, after data are developed on the penetration and effectiveness of the state certification program within the District. The District also dropped proposed Rule 4671 for Perchloroethylene Dry Cleaning because perchloroethylene was delisted as a volatile organic compound by U.S. EPA. The District will need to cover the emission reduction shortfall resulting from removal of these two rules in the upcoming Ozone SIP revision.

The 1997 Triennial Update also revises the projected emission reductions for CCAA purposes to match the 1994 Ozone SIP projections for the same rule, where the estimates differed. These revisions affect Rules 4601, 4607, 4623, 4642, 4662, 4663, 4701, and 4621/4622. The "rounded up" values for emission reductions from proposed measures 4611 and 4411 were also used in the 1997 Triennial Update.

C. All Feasible Measures Review

The most efficient way to reduce emissions is to prevent them from being emitted at the source. Stringent prohibitory rules requiring best available retrofit control technology (BARCT) for existing sources go hand-in-hand with the application of best available control technology (BACT) for new and modified sources. This combined effort assures the progress necessary in achieving the ozone standards expeditiously. Prohibitory rules that forgo stringent emissions limits contribute to delays in attaining the air quality standards.

The importance of assuring that control measures require the best technology can be demonstrated with the following scenario: if a single newly permitted turbine were allowed to emit 9 ppm of NO_x instead of a more stringent 2.5 ppm level, potentially over one-half ton per day of NO_x emission reductions could be forgone. If a prohibitory turbine rule required each existing turbine to reduce its emissions by just 2 ppm NO_x and there were ten turbines operational in the area, NO_x emissions could be reduced by about 1.5 tons per day under normal operating conditions. Likewise, it is just as important that new sources be permitted at the most stringent level available to avoid lost opportunities for emission reductions.

Severe nonattainment areas (and those identified as upwind contributors to transported pollution in downwind areas) are required to implement BARCT for all existing permitted stationary sources of ozone precursors. In the 1997 Triennial Update, the District indicates that 35 of its prohibitory rules for control of NO_x and VOC from existing sources were at BARCT level at the time of their adoption. These rules were adopted since the formation of the Unified District in 1991.

Since stationary source control technology continually improves, rules adopted several years ago may warrant amendment to reflect current advances in air pollution control. Control measures for some source categories, initially postponed due to high cost per ton of pollutant reduced, may now have a lower cost-effectiveness as the control technology becomes more widespread. Also, as emission reductions become more challenging to secure, air agencies generally increase the cost-effectiveness threshold to continue progress. For such reasons, periodic review of existing control measures is important to determine if rules are still at BARCT level and if there are additional feasible measures that can be adopted by the District. The next section identifies District rules that require control less effective than BARCT.

In this section, we present our evaluation of whether the District's plan meets the CCAA standard for "all feasible measures," which incorporates consideration of both available technology and economic impacts. In March 1998, ARB published *Identification of Achievable Performance Standards and Emerging Technologies for Stationary Sources: A Draft Resources Document* (Resources Document) which identified the most effective rules in place in California's air districts for each of 25 source categories. We use this Resources Document as the benchmark for the identified categories. The San Joaquin District hired a contractor to assess the feasibility of achieving further emission reductions from thirteen stationary source categories covered in the Resources Document. We began our assessment with the consultant's report and then examined additional categories. Rules or source categories determined to be at less than an all feasible level of control offer opportunities for further emission reductions.

1. ARB Staff Analysis of Consultant Report on District Measures

In the 1997 Triennial Update, the District committed to assess the feasibility of achieving further emission reductions from thirteen stationary source categories and to incorporate any feasible control measures into the rulemaking schedule for the next triennial update. The District contracted with Kram Environmental Engineering Services (Kram) to determine the emission inventories for those categories and evaluate the feasibility of achieving additional emission reductions, based on ARB's Resources Document. For source categories reviewed by Kram, nine are covered by existing District rules and four source categories are currently uncontrolled. The report prepared by Kram, "San Joaquin Valley Unified Air Pollution Control District's Control Measure Evaluation Project" (Kram report) was provided to ARB in July 1999 for use in our evaluation of the 1997 Triennial Update. We reviewed the Kram analysis and determined that opportunities exist to achieve additional reductions in the near-term from several stationary source categories. While the Kram report identified the potential for additional reductions in ten of the thirteen

source categories, our analysis showed opportunities in twelve of the thirteen categories. In each case, emission limits or work practice standards that can achieve additional reductions in the District have already been through a public review process in other California air districts and have been found to be cost-effective and technically feasible. As such, the rule development process should be streamlined when the District moves forward on amending or adopting these measures. Table III-4 shows the source categories reviewed by Kraim, along with the Kraim and ARB determination of whether the District's rules for each category meet the all feasible measures criteria.

**Table III-4
Summary of All Feasible Measures Analysis for
Source Categories Reviewed by District Consultant**

Source Category	District Meets All Feasible Criteria		District Rule Number and Name
	District's Consultant	ARB	
• Restaurants, Chain Driven Charbroilers	No	No	Proposed Control Measure 4692 – Commercial Charbroiling
• Fugitive Emissions of Volatile Organic Compounds from Chemical Plants	No	No	4451 - Valves, Pressure Relief Valves, Flanges, Threaded Connections and Process Drains at Petroleum Refineries and Chemical Plants
• Fugitive Emissions of Volatile Organic Compounds from Oil and Gas Production and Processing Facilities	No	No	4452 - Pump and Compressor Seals at Petroleum Refineries and Chemical Plants
• Fugitive Emissions of Volatile Organic Compounds Petroleum and Pipeline Transfer Stations	No	No	4403 – Components Serving Light Crude Oil or Gases at Light Crude Oil and Gases Production Facilities and Components at Natural Gas Processing Facilities
• Large Water Heaters and Small Boilers	No	No	4305 - Boilers, Process Heaters and Steam Generators
• Industrial, Institutional and Commercial Boilers, Steam Generators and Process Heaters	No	No	
• Stationary Internal Combustion Engines	No	No	4701 – Internal Combustion Engines
• Bakery Ovens	No	No	NEW
• Adhesives and Sealants	Yes	No	4653 – Adhesives
• Automotive Refinishing	Yes	No	4602 - Motor Vehicle and Mobile Equipment Refinishing Operations
• Pleasure Craft Coating Operations	No	No	NEW
• Surface Coating of Plastic Parts and Products	No	No	Proposed Control Measure 4608 - Plastic Parts Coatings Operations
• Aerospace Assembly and Component Manufacturing Operations	Yes	Yes	4605 – Aerospace Assembly and Component Manufacturing Operations

Our findings for each of the stationary sources categories evaluated by Kram are summarized below.

- Restaurants, Chain Driven Charbroilers. The District currently does not have a rule for restaurant chain driven charbroilers. The Kram analysis indicated additional VOC emission reductions would be realized from adoption of a rule for this source category. Based on our review of the Kram report and the existing rule for this source category in the South Coast Air Quality Management District (South Coast District), ARB staff recommend the District proceed with development of a rule for sources in the District. In the South Coast District, the control efficiency achieved in practice by chain-driven charbroilers equipped with catalytic oxidizers was 83 percent for both VOC and PM_{2.5}. Adoption of such a rule in the District will result in measurable emission reductions for both VOC and PM₁₀.
- Emissions of Volatile Organic Compounds from Oil and Gas Production and Processing Facilities, Refineries, Chemical Plants, and Pipeline Transfer Stations. Three District rules, Rules 4403, 4451, and 4452, address fugitive emissions. Rules 4451 and 4452 address fugitive emissions at chemical plants and refineries. Rule 4403 establishes controls on fugitive emissions at oil and gas production and processing facilities. The Kram report indicated that further restrictions on fugitive emissions could result in emission reductions from these sources in the Valley. Based on analysis of the information provided in the Kram report and review of the other district rules, we conclude that these rules do not meet RACT requirements. Specifically, we recommend each rule be amended to be as stringent as South Coast District Rule 1173 and the ARB guidance for this source category specified in “Determination of Reasonably Available Control Technology for the Control of Fugitive Emissions of Volatile Organic Compounds from Oil and Gas Production and Processing Facilities, Refineries, Chemical Plants, and Pipeline Transfer Stations,” (December 1993). There is the potential to achieve additional emission reductions from amending the fugitive emission rules to require more frequent inspection schedules, shorter repair times, and more stringent requirements for chronic leakers.
- Refinery Boilers (also Small Industrial, Institutional and Commercial Boilers, Steam Generators and Process Heaters). District Rule 4305 establishes control requirements for gaseous fuel or liquid fuel fired boilers, steam generators and process heaters. Small boilers, those less than 5MM Btu/hr, are exempt from controls. Based on our analysis of the Kram report and the District Rule 4305, we believe additional emission reductions from this source category can be realized if Rule 4305 is modified to be more restrictive. ARB staff recommends the District amend Rule 4305 to: (1) require boilers to meet a NO_x emission limit of 0.03 lb NO_x/MMBtu (refinery-wide) consistent with South Coast District Rule 1109 and extend this requirement to all other similar sized boilers as

well¹; (2) increase the applicability of Rule 4305 by establishing emission control limits for the smaller boilers, < 5MM Btu/hr; and (3) modify the provisions in section 5.2 which allow less stringent standards for units with an annual heat input less 30 billion Btu to only apply to units with annual heat input less than 9 billion Btu (consistent with other districts' rules).

- Stationary Internal Combustion Engines. District Rule 4701 establishes controls on NOx, CO and VOC emissions from internal combustion engines. The Kram analysis concluded that significant NOx reductions could be realized by adopting more effective performance standards for this source category. We agree. Over the past few years, ARB and the California Air Pollution Control Officers Association (CAPCOA) have worked to develop a RACT/BARCT determination for stationary internal combustion engines for Board consideration next year. Our review of an earlier draft determination proposed in 1997 revealed that the current limits, exemptions and compliance testing provisions in Rule 4701 are less effective. The District should consider this information as well as new data on low emission technologies that has become available in the last three years when revisiting Rule 4701 to update the BARCT requirements.
- Bakery Ovens. The District does not have a source specific rule for bakery ovens. We agree with the Kram analysis that controls on bakery ovens will result in VOC emission reductions. Kram recommended control requirements similar to those in the South Coast District Rule 1153, however, ARB staff recommends the District consider adoption of a rule consistent with the controls specified in the Sacramento Metropolitan Air Quality Management District (Sacramento District) Rule 458. Sacramento District Rule 458 is essentially consistent with the South Coast Rule 1153 with the exception of more effective controls on the smaller bakeries.
- Adhesives and Sealants. District Rule 4653 controls emissions from the application of adhesives. The Kram report concluded that there were no additional emission reduction opportunities. We disagree and recommend that: (1) Rule 4653 be amended to address emissions from sealants, consistent with the recently approved BARCT/RACt determination for these products; and (2) the District consider lowering the VOC limits on adhesive products for bonding to porous materials and rubber, consistent with the limits in the applicable BARCT/RACt document.
- Automotive Refinishing. District Rule 4602 establishes control requirements for automotive refinishing operations. The Kram analysis concluded that few, if any, emission reductions could be realized by conforming Rule 4602 to the identified

¹ In the Kram report, it was reported that BACT for the South Coast District Rule 1109 is Low Temperature Oxidation Process system (LTO) which can reduce NOx emissions to 5ppmv NOx for new equipment but at a greater cost than low NOx burners with flue gas recirculation (FGR). However, a combination of external FGR, low NOx burners, and selective catalytic reduction can achieve 5 ppmv NOx and this combination of proven technologies may be more cost-effective than LTO.

performance standards. However, we recommend that the District consider improvements to Rule 4602 to make the VOC standards consistent with the limits in South Coast District Rule 1151 for Group I primer sealer, metallic/iridescent topcoats, and multi-state topcoats; as well as Group II primer sealer, topcoat, and metallic/iridescent topcoats.

- Pleasurecraft Coating Operations. The District does not have a rule that controls emissions from pleasurecraft coating operations. While the inventory appears to be small for this source category, emission reductions could be realized through the adoption of a prohibitory rule. Consistent with Kraim's findings, we recommend that the District consider adoption of a measure similar to South Coast District Rule 1106.1 to maximize emission reductions from this category.
- Surface Coating of Plastic Parts and Products. The District does not have a source specific rule for the coating of plastic parts and products. Though the inventory for this category appears to be very small based on available data, we recommend the District further evaluate the emission inventory for this source category. If sufficient sources and emissions are present to justify rule development, we encourage the District to pursue a measure.
- Aerospace Assembly and Component Manufacturing Operations. District Rule 4605 controls emissions from aerospace assembly operations. The Kraim report concluded that there were not additional emission reduction opportunities from this source category. We agree that additional emission reductions may not be achievable in the near-term from this control measure.

3. Additional Measures Identified by ARB Staff

ARB staff evaluated the commitments adopted by the District during the previous planning cycle (1995-1997) and those adopted in the current planning cycle to determine if the current control program represents all feasible measures. This evaluation included a comparison of the rules to the applicable BARCT determinations, the ARB Resource Document, or adopted rules from other air districts where appropriate. Our evaluation determined that two of the eight recently adopted rules (1995-1998) do not appear to meet the "all feasible measures" criteria.

- Rule 4305 - Boilers, Process Heaters, Steam Generators. This control measure was intended to be BARCT level control for External Combustion Devices for Small Sources. It was adopted as an amendment to Rule 4305 for Boilers, Process Heaters, Steam Generators. Rule 4305 does not represent all feasible measures due to the exemptions and the limits of 30 and 40 ppmv for NOx. Commercially available technology can achieve limits in the 9-30ppmv range. The cost-effectiveness of tightening the emission limits in the District rule should be re-examined in light of current technology.

- Rule 4701 - Internal Combustion Engines. See discussion under previous section.

In addition to reviewing plan commitments, ARB staff evaluated existing District rules and identified two rules where additional emission reduction opportunities exist.

- Rule 4703 - Stationary Gas Turbines. For gas-fueled turbines between 2.9 and 10 megawatts, this rule sets a NOx limit of 42 ppm which exceeds the ARB/CAPCOA BARCT determination limit of 25 ppm. This rule may not represent “all feasible measures” and needs to be further evaluated by the District.
- Rule 4682 - Polymeric Foam Product Manufacturing. Existing Rule 4682 does not meet the most effective performance standard identified in ARB’s Resource Document because it does not require capture and control of VOC emissions that occur during all the steps of the manufacturing process. The District should amend Rule 4682 to require control systems that collect and treat all VOC emissions (including fugitives) on every stage in the manufacturing process -- from receipt of raw materials to final manufacture to storage of the finished product. As a reference, the District should follow the criteria specified in South Coast District Rule 1175.

4. Cost-Effectiveness Threshold

Several existing District rules have been identified as being less stringent than rules in other districts controlling similar source categories. Several of these less stringent rules have been attributed to the fixed cost-effectiveness thresholds established in the San Joaquin Valley. The District has acknowledged that BARCT rules for the Valley may not be as stringent as those in other air districts with similar air quality. The current cost-effectiveness thresholds applied by the District when considering rulemaking action are: \$9,700 per ton of NOx reduced NOx and \$5,000 per ton of VOC reduced. These thresholds are used to determine what control technology or emissions limits should be placed on sources. In 1996, the District formed an Economic Assessment Subcommittee to discuss cost-effectiveness thresholds. The Subcommittee has not yet proposed a change to this approach.

For purpose of comparison, we conducted a preliminary survey of other districts to identify their cost-effectiveness thresholds. Table III-5 shows that other districts with similar ozone levels have generally established higher cost-effective thresholds. What this means in practice is that other air districts with similar air quality requirements are adopting more stringent control measures due to higher cost-effectiveness thresholds.

**Table III-5
Preliminary Survey Results for Cost-Effectiveness Thresholds**

District (State Ozone Classification)	BARCT Threshold (\$/ton reduced)		BARCT Case-by-Case Range (\$/ton reduced)		BACT Thresholds (\$/ton reduced)	
	VOC	NOx	VOC	NOx	VOC	NOx
San Joaquin Valley (Severe)	5,000	9,700	Not applicable		---	9,800
Ventura (Severe)	18,000	18,000	---	600 – 13,500	18,000	18,000
Bay Area (Serious)	No thresholds		1,000 - 11,300	---	17,500	---
San Diego (Serious)	---	14,000	1,200 - 6,400	14,000	7,500	12,900
Santa Barbara (Moderate)	No thresholds		100 – 14,400	300 – 19,600	---	---

5. *Priorities for Future District Rulemaking*

The District commitments in the 1994 CCAA Plan and the 1997 Triennial Update that have not yet been fulfilled, as well as the rules identified by ARB staff as less than all feasible, yield a list of measures that the District should pursue in future rulemaking. The next issue is the priority that each of these measures should have for District evaluation and rule development.

The District believes that the first step in prioritizing their rule development effort is to determine the inventory and the potential for emission reductions by source category. We expect that an updated emissions inventory will be available in 2000 to allow the District to better determine the priorities for each measure on the list.

To develop our view of priorities for District rulemaking, we evaluated the best available inventory information, as well as the effectiveness and availability of controls already in place in other air districts. We sought to determine which measures should still be considered in the short-term for rulemaking in the current and upcoming state planning cycle. We also considered that in 2001, the District will be revising its 1994 Ozone SIP to demonstrate attainment of the federal one-hour ozone standard by 2005. Emission reductions attributed to the 1994 and 1997 CCAA plan-only commitments will likely be needed for federal attainment purposes as well.

First Priority. ARB staff agrees with the District's staff conclusion that SIP commitments made in the 1994 plan coincide with those measures that have the greatest emission reduction potential according to the existing inventory. Those SIP commitments should have highest priority since these commitments were scheduled for adoption by year-end 1996 and implementation by 1999 for federal attainment purposes. In addition,

Rule 4661 belongs on this list due to the federal sanctions clock currently running on that rule. Every effort should be made to keep on schedule in adopting these commitments by year-end 2000.

- Amendment to Rule 4601 – Architectural Coatings
- Amendment to Rule 4662 – Organic Solvent Degreasing Operations
- Amendment to Rule 4661 – Organic Solvent
- Amendment to Rule 4623 – Organic Liquid Storage
- Proposed New Rule (4411) – Well Cellars
- Proposed New Rule (4692) – Commercial Charbroiling
- Proposed New Rule (4663) – Organic Solvent Waste
- Amendment to Rule 4103 – Open Burning

Second Priority. The District needs to address the remaining 1994 CCAA-only commitments and measures for the source categories where ARB has identified the current requirements as less than all feasible measures as the next priority. The District should identify the inventory, potential reductions, and priority for rulemaking in the next CCAA triennial plan revision. Based on the results of this analysis, the District will also need to make steady progress in adopting all of these measures, unless it demonstrates that a measure is not technically feasible, not cost-effective, or the emission inventory does not justify rulemaking.

- Proposed New Rule (4410) -- Gas Plant Glycol Regenerators
- Proposed New Rule (4627) -- Tank Cleaning and Venting
- Proposed New Rule (4307) or Amendment to Rule 4305 -- Dryers (as BARCT)
- Amendment to Rule 4305 -- Boilers, Process Heaters, Steam Generators
- Amendment to Rule 4701 – Stationary and Portable Piston Engines
- Amendment to Rule 4403 -- Components Serving Gas Production Facilities
- Amendment to Rule 4451 -- Valves, Pressure Relief Valves, Flanges, Threaded Connections and Process Drains at Petroleum Refineries and Chemical Plants
- Amendment to Rule 4452 -- Pump and Compressor Seals at Light Crude Oil and Gases Production Facilities & Components at Natural Gas Processing Facilities
- Amendment to Rule 4703 -- Stationary Gas Turbines
- New Rule for Bakery Ovens
- Proposed New Rule (4409) -- Discharge of Produced Oil/Flashing Losses
- Proposed New Rule (4408) -- Oil Pipeline Pumping Fugitives
- Proposed New Rule (4308) -- Asphalt Batch Plants & Hot Mix Asphalt Batch Plant Fugitives
- Proposed New Rule (4643) -- Publicly Owned Water Treatment Works
- Amendment to Rule 4653 -- Adhesives
- Amendment to Rule 4602 -- Automotive Refinishing
- New Rule for Pleasure Craft Coating
- Amendment to Rule 4682 -- Polystyrene Foam Manufacturing

These two priority groups do not address several of the previous commitments included in the 1997 Triennial Update as being either delayed to the 2004-2006 timeframe or as “further study” measures. As the District further improves the emissions inventory, it will be able to further address these commitments in upcoming federal and state plans.

IV. MOBILE SOURCE PROGRAMS

This chapter describes the emission reductions being achieved by state and federal mobile source control programs in the San Joaquin Valley. It also reviews programs to reduce emissions from transportation sources undertaken by the District, by the cities and counties and by the county transportation planning agencies. While the major reductions are coming from emission standards for mobile sources, considerable potential also exists for reductions from transportation strategies and incentive programs for clean engines.

A. State and Federal Controls on Mobile Sources

On- and off-road mobile sources currently are the largest source of ozone precursor emissions in the San Joaquin Valley, accounting for half of ozone precursor emissions. We expect upcoming inventory improvements to show that the mobile source contribution is even higher than the current inventory indicates. Controlling emissions from these sources is the cornerstone of California's strategies to meet the state and federal ambient air quality standards for ozone.

In 1994, ARB undertook a comprehensive evaluation of the State's mobile source programs and the feasibility of additional control strategies. Based on this evaluation, ARB included 16 commitments for new mobile source measures in the 1994 Ozone SIP for the South Coast. Most of these commitments are for statewide measures that will also benefit the San Joaquin Valley by reducing emissions from cars and pickup trucks, heavy-duty trucks, and a variety of off-road equipment. Seven of the 1994 SIP mobile measures are assignments to U.S. EPA to reduce emissions from sources under exclusive or practical federal control (like aircraft, locomotives, interstate trucks, and farm and construction equipment).

ARB has made significant progress toward adopting measures that implement almost all of our near-term SIP commitments. In addition, the Board has adopted additional measures that achieve cost-effective emission reductions. U.S. EPA has also made significant progress toward reducing emissions from federal sources. In fact, the 1994 SIP measures adopted to date will reduce 1998 emissions of ozone precursors from both on-road vehicles and off-road equipment by over 50 percent in the San Joaquin Valley by 2010. The following sections describe state and federal regulatory actions for mobile sources for each type of vehicle.

1. *Light- and Medium-Duty Vehicles*

In 1990, ARB adopted the Low-Emission Vehicle (LEV) Program. The LEV Program was the first regulation to recognize that vehicle technology and clean fuels can work as a system to achieve lower emissions. It is a market-based program allowing automakers to introduce a mix of low-emission vehicles and a specified number of zero-emission vehicles, as long as a fleet average emission standard is met through 2003.

In November 1998, ARB adopted the second phase of the Low-Emission Vehicle program (LEV II). LEV II will reduce emissions from passenger vehicles by further lowering the fleet average emission standard beginning in 2004 and by applying comparable passenger car exhaust emission standards to most sport utility vehicles, pick-up trucks, and mini-vans. LEV II also calls for up to an 80 percent reduction in evaporative emissions and includes additional mechanisms for zero-emission vehicle credits to encourage the introduction of advanced near-zero emission vehicle technology, including fuel cell vehicles and “hybrid” vehicles using a combination of power sources.

As new cars have become cleaner, ARB’s attention has turned to ensuring that vehicles maintain low-emissions throughout their useful life, during all types of driving. Since 1996, new cars have been equipped with on-board diagnostics programs to alert drivers when a problem is detected in the emission control system and to help service technicians quickly diagnose and fix problems.

As part of the 1994 SIP, California committed to implementing improvements to the existing basic Smog Check program. These improvements fulfill the federal Clean Air Act requirement for enhanced vehicle inspection and maintenance in federal ozone nonattainment areas classified serious and above, including the San Joaquin Valley. In California, the enhanced program (known as Smog Check 2) applies to the urbanized portions of nonattainment areas with populations over 50,000 and is operated by the Bureau of Automotive Repair. Although the State has experienced difficulties in the initial start-up of Smog Check 2, we are working with the Bureau of Automotive Repair to develop an effective and user-friendly program. The entire Smog Check program remains an important means of obtaining near-term emission reductions from the on-road passenger car and light truck fleet.

In 1998, ARB also adopted a new measure calling for tighter emission standards for on-road motorcycles beginning in 2004. While this measure was not included in the 1994 SIP, the reductions from cleaner motorcycles will help ARB fulfill its near-term commitments.

2. *Medium- and Heavy-Duty Gasoline Trucks*

In 1995, ARB accelerated the implementation of a tighter NOx standard for medium-duty vehicles and adopted lower emission standards for heavy-duty gasoline trucks. In concert with U.S. EPA, ARB is now considering a further tightening of the emission standards for new heavy-duty gasoline trucks that would take effect around 2004. These measures, combined with the LEV II Program, will ensure that medium and heavy-duty gas trucks utilize the most up-to-date emission control technologies.

3. *Heavy-Duty Trucks and Buses*

In response to the 1994 SIP commitments, ARB signed a Statement of Principles with U.S. EPA and engine manufacturers committing to cut NOx emissions from on-road heavy-duty engines in half. U.S. EPA formally adopted the new standards in 1997, and ARB aligned California's standards with the national regulation in 1998. The new state and national standards were scheduled to take effect in 2004, but have now been accelerated to 2002 in response to a settlement with diesel engine manufacturers.

Recent studies have shown that excess emissions occur when heavy-duty diesel vehicles operate at the high-speed, high-load conditions that are typical of interstate highway travel. The standard test cycle to certify new engines to the applicable emissions standards does not reproduce these conditions. These excess or "off-cycle" emissions resulted from the use of computerized timing strategies that maximize fuel economy, but increase emissions, under highway driving conditions. U.S. EPA and ARB have settled with major engine manufacturers to prohibit off-cycle emissions in new vehicles, and provide reparations for vehicles that are already in use. The settlement also moves up implementation of the 2004 emission standards to October of 2002, which will allow the San Joaquin Valley to benefit from three years of fleet turnover by the expected 2005 attainment date for the federal one-hour ozone standard.

ARB is now working to define the next set of emission goals for new heavy-duty trucks and buses. We are developing proposals for zero and near-zero emission urban transit buses for Board consideration in January 2000. We are also evaluating the feasibility of proposals for trucks to further reduce NOx emissions by over 75 percent and PM10 emissions by 80 percent by the 2007 timeframe. The ultra-low sulfur diesel fuel specifications being assessed by U.S. EPA are an important element of our feasibility analysis.

While emission standards for new engines ultimately yield significant reductions, the slow pace of fleet turnover for heavy-duty engines delays the benefits. To complement the emission standards, ARB has aggressively pursued incentive measures to encourage the early introduction of clean engines. The Carl Moyer program received \$25 million in State funds for the 1998-1999 fiscal year to encourage the purchase of cleaner trucks and other diesel engines. In 1999, ARB adopted guidelines for district programs to allocate Moyer program funds. The demand for Moyer funds was three times the available dollars in the first year of the program. The 1999-2000 State budget includes \$19 million to fund another year of the Moyer Program as well as \$4 million to the California Energy Commission for advanced vehicle technology and infrastructure programs. State legislation awaiting the Governor's signature, would create ongoing funding for the Moyer program. ARB also adopted a resolution in 1998 calling upon State, local and federal agencies to substantially reduce emissions from school and transit bus fleets by purchasing cleaner alternative-fuel buses.

In response to the Board's identification of particulate matter from diesel-fueled engines as a toxic air contaminant in 1998, we are now engaged in a process with stakeholders

to craft a risk management strategy. This strategy may call for further controls or accelerated replacement of diesel engines used in both mobile and stationary source applications.

ARB also operates a heavy-duty vehicle inspection program consisting of a random roadside smoke opacity test and an under-the-hood inspection. In 1998, we initiated a new program requiring owner/operators with more than two vehicles in their fleet to conduct annual self-inspections. These programs are designed to reduce excessive in-use emissions (primarily of PM₁₀) that are the result of improper vehicle maintenance practices and tampering. We are also in the early stages of developing additional in-use tests to ensure that NO_x emissions remain within the certification standards.

4. *Off-Road Equipment*

The 1994 SIP calls for substantial emission reductions from off-road sources, such as portable generators, forklifts, and construction equipment. Because ARB and U.S. EPA share authority over these sources, the off-road measures in the SIP were structured as parallel state and federal measures. In 1998, ARB adopted new emission standards for gasoline and liquified petroleum gas fueled off-road equipment (like forklifts) powered by spark-ignition engines. U.S. EPA is planning on adopting similar requirements for the engines in this category that fall under its jurisdiction.

In 1998, U.S. EPA adopted new national standards for diesel fueled off-road equipment. ARB is currently developing a similar regulation to reduce emissions from this equipment for consideration by the Board in December 1999. Under the terms of a 1996 agreement between ARB, U.S. EPA and the engine manufacturers, emission standards for off-road diesel engines will phase-in beginning in 2001 – four years earlier than expected in the SIP.

ARB's regulations also limit emissions from small off-road engines (such as those used in lawn and garden equipment) and off-road recreational equipment. Furthermore, the Board adopted new requirements this year to significantly reduce VOC emissions from the portable fuel containers that are used primarily to fuel these engines, beginning in 2001.

5. *Marine Pleasurecraft*

In 1995, U.S. EPA adopted new emission standards for marine pleasurecraft, such as outboard motors, personal watercraft, and small jet boats. In 1998, ARB adopted emission standards for marine pleasurecraft that go well beyond those adopted by U.S. EPA. In the process of improving the emission inventory, we found that emissions from marine pleasurecraft were much higher than assumed in the 1994 SIP, particularly on summer weekends when recreational use peaks. These new standards will significantly reduce VOC emissions, beginning in 2001. ARB and U.S. EPA are currently evaluating whether to develop new emissions standards for in-board marine engines as well.

6. *Other Mobile Sources under Federal Control*

The federal government has actively pursued emission reductions from sources under its exclusive control, largely in response to the pressure from California and other states with serious ozone problems. In 1997, U.S. EPA established more stringent emission standards for new and re-built locomotives nationwide beginning in 2000. In addition, we are continuing to work with U.S. EPA and other interested parties to reduce emissions from marine vessels and ports, and aircraft and airports consistent with the 1994 SIP.

As part of a consent decree to settle its portion of a lawsuit on implementation of the 1994 Ozone SIP for the South Coast, U.S. EPA will consider specific short and long-term strategies that offer the opportunity for significant additional emission reductions from federal sources in all areas. These measures include: tighter emission standards for light-duty vehicles nationwide, emission standards for off-road spark-ignition engines, emission standards for inboard engines used in marine pleasurecraft, federal requirements for low-sulfur diesel fuel, federal financial incentives for cleaner heavy-duty engine technologies, further lowering the NO_x and particulate matter emission standards for heavy-duty diesel vehicles, an in-use compliance program to control NO_x emissions from heavy-duty diesel vehicles, and a number of approaches to reduce marine and aircraft-related emissions.

7. *Fuels*

In 1996, the second phase of reformulated gasoline (“cleaner burning gasoline”), was introduced statewide. The air quality benefits of cleaner burning gasoline were significant and immediate – the equivalent to removing 3.5 million cars from California’s roadways. With the introduction of cleaner-burning gasoline in 1996, gasoline refiners also used additives to reduce combustion chamber deposits. The decrease in combustion chamber deposits led to an unexpected additional decrease in NO_x emissions. In 1998, ARB adopted regulations to require the use of such additives to “lock in” the NO_x benefits already realized.

In December 1999, ARB staff will propose specification for Phase 3 gasoline. The new specifications would support the phase-out of methyl tertiary butyl ether (MTBE) from California gasoline by the end of 2002, consistent with Governor Davis’ Executive Order. Phase 3 gasoline would preserve the air quality benefits of cleaner burning gasoline and also further lower the sulfur and benzene content of gasoline to reduce emissions.

B. Update to Statewide Mobile Source Control Strategy

ARB is planning a comprehensive evaluation of the State’s mobile source strategy in 2000, as part of the South Coast SIP update. This evaluation will reflect the increased emissions from on-road and off-road mobile sources generated by the new emission models, as well as changes to the attainment needs of the South Coast and San

Joaquin Valley for the federal one-hour ozone standard. The update will include an assessment of additional mobile source measures as part of our continuing search for technically-feasible, cost-effective strategies to help California meet all state and federal air quality standards.

C. Transportation Strategies

The San Joaquin Valley faces a complex transportation planning environment, with eight separate county transportation planning agencies (TPAs) shaping the Valley's future transportation system. In 1992, the District entered into a Memorandum of Understanding with the TPAs for cooperation in developing TCMs and reducing emissions from the transportation sector.

This interagency cooperation continues today. District staff has been a steady proponent of both reducing the growth in passenger vehicle travel and deploying clean transportation technologies. District funds have been used to reduce travel and emissions, and the District has had some success in persuading Valley TPAs to focus more dollars on projects that reduce pollution from the transportation system. Though more funds are being provided to transit, bicycle and pedestrian projects than in past years, the Valley's urban areas still expect to devote the lion's share of transportation resources to road projects, according to regional transportation plans.

1. *Transportation Control Measures*

Transportation control measures (TCMs) are strategies to reduce vehicle trips, vehicle use, vehicle miles traveled (VMT), vehicle idling, or traffic congestion for the purpose of reducing motor vehicle emissions. The CCAA requires adoption and implementation of TCMs "sufficient to substantially reduce the rate of increase in passenger vehicle trips and miles traveled per trip if the district contains an urbanized area with a population of 50,000 or more."

Table IV-1 shows the TCMs that have an effect on reducing vehicle miles traveled or mobile source emissions. The District's 1994 Ozone SIP relied on a broad commitment for TCMs without specifying which strategies would provide the 1.8 tpd VOC and 1.5 tpd NOx reductions credited in that plan.

Regulatory TCMs. The District's 1994 CCAA Plan included three regulatory TCMs -- Rule 9001, Rule 9010, and Rule 9011. The District adopted Rule 9001 Commute Based Trip Reduction in 1994, but rescinded it in 1995 to comply with a new state law. Health and Safety Code Section 40717.9 (formerly section 40929) prohibits public agencies from requiring employers to implement employer trip reduction programs, unless the program is expressly required by federal law and the elimination of the program will result in the imposition of federal sanctions. The District states that it did not adopt the two fleet rules -- Rules 9010 and 9011 -- because ARB's Low-Emission Vehicle Program satisfied the associated federal requirements.

Table IV-1
San Joaquin Valley Transportation Control Measures in Ozone Plans

Transportation Control Measure	Plan Reference
Unspecified TCMs	1994 SIP
Regulatory TCMs - Rule 9001 Commute Based Trip Reduction - Rule 9010 Fleet Inventory - Rule 9011 Light and Medium Duty Low-Emission Fleet Vehicles	1994 CCAA Plan Dropped in 1997 Triennial Update
MOU with TPAs TCM1 - Traffic Flow Improvements TCM2 - Public Transit TCM3 - Rideshare Programs TCM4 - Bicycle Programs TCM5 - Alternative Fuels Program	1994 CCAA Plan Continued in 1997 Triennial Update

Traffic Flow Improvements. The transportation agencies have implemented traffic flow improvements (TCM 1) including, signal synchronization, interconnection, and improved timing projects. Unfortunately, studies indicate speed improvements occurring immediately after implementation decline to no improvement by the end of the effectiveness period (two to five years). The District estimated that TCM 1 would reduce VOC by 0.58 tpd in 2000, but would increase NOx by 1.75 tpd. This is a typical dilemma associated with traffic flow improvements.

Public Transit. The 1991 CCAA Plan included TCM 2 - Public Transit with reductions of 0.16 tpd NOx and 0.15 tpd VOC. What is not clear from reviewing the plan documents is the size and effectiveness of transit program in 1991 and what specific improvements were projected to increase the impact of transit in the Valley. As the San Joaquin Valley continues to grow, the area needs to continue expanding the public transportation system. Implementation of stringent motor vehicle emission standards over many years has resulted in a much cleaner California automobile fleet and thus when transit is used in place of automobile trips, it needs to at least match the emission reduction effectiveness of automobiles on a person trip basis.

Alternative-Fuel Transit Buses. There are eight transit districts in the San Joaquin Valley, with a total fleet of about 400 transit buses. The District and ARB have both been active at Valley transportation agency and transit district board meetings encouraging the purchase of cleaner alternative-fueled transit buses. The Valley has been making strides toward substantially reducing NOx emissions from transit bus fleets by purchasing cleaner alternative-fuel buses. Table IV-2 shows that approximately 20 percent of the Valley's bus fleet is currently alternative-fueled.

**Table IV-2
Current Transit Fleet in the San Joaquin Valley**

Transit Districts	Total Fleet	Alternative Fuel Buses	% Alternative Fuel Buses
Fresno Area Express	97	0	--
Fresno County Rural Transit Agency	50	50	100
Golden Empire Transit District	72	19	26.2
Kern Regional Transit	12	8	66.7
Merced County Transit	18	0	--
Modesto Intracity Transit	38	0	--
San Joaquin Regional Transit District	99	0	--
Tulare County Transit	9	0	--
Total	395	77	19.5

Alternative-Fueled School Buses. The San Joaquin Valley school bus fleet is significantly larger than the transit fleet. The California Highway Patrol reports approximately three thousand school buses in operation in the Valley and roughly 15 percent are pre-1997 diesel school buses. These older school buses emit three times more NOx and four times more diesel particulate matter than CNG buses. The District is using incentive dollars to clean up school buses. In fiscal year 97-98, the District funded nearly 80 CNG school buses.

Rideshare Programs. Each of the Valley's transportation planning agencies has a voluntary rideshare program that includes services such as carpool ride matching and employer ridesharing assistance.

Bicycle Programs. The District has significantly increased efforts to fund bicycle infrastructure and supporting projects. In fiscal years 1996-97 and 1997-98, the District spent over \$2.7 million of motor vehicle registration fees for bicycle projects. This amount is nearly 10 times more than was spent in the prior two fiscal years.

Research indicates that cities with at least one mile of bike lane for every three miles of arterial roadway have three to ten times higher average bicycle commuting rates than cities with lesser ratios. ARB estimated that if 3 percent of projected light-duty vehicle trips could be replaced by bicycle trips, then over 2 tpd of smog-forming gases could be reduced in the San Joaquin Valley in the year 2010.

Alternative Fuels Program and Other Mobile Source Programs. An initiative begun by the District in 1997 is the Heavy Duty Vehicle Emission Reduction Program. The District provides financial incentives to municipalities, companies, fleet operators and individuals who purchase new, replacement or retrofit technology for low emission heavy-duty on-road and off-road vehicles meeting the program criteria. The program is

funded with motor vehicle registration fees and Carl Moyer monies. The District is working to extend its reach and emission reduction benefit through the infusion of federal Congestion Mitigation and Air Quality Improvement (CMAQ) Program funds. Emission reductions are exceeding initially projected benefits by more than 40 percent, and the program could be an especially cost-effective use of CMAQ funds.

The District provides incentives for light-duty alternative-fuel vehicle purchases and leases through its REMOVE Evaluation Committee and funded with vehicle registration monies. The District has also implemented a voluntary Vehicle Buy-Back Program to remove pre-1982 vehicles from the road, and a Smoking Vehicle Program.

2. Indirect Source Programs

The CCAA requires attainment plans to include provisions to develop an indirect source control program. The District has met this requirement with an ongoing education and outreach program to city and county planners as illustrated in Table IV-3.

**Table IV-3
San Joaquin Valley Indirect Source Control Program**

Guidance	Status
Model Air Quality Element (published 1994): <i>Air Quality Guidelines for General Plans</i>	Document used by cities & counties when updating plans.
Enhanced CEQA Review	District staff review over 1,800 environmental documents each year.
URBEMIS – Land use emissions estimation model for local planners	Funded extensive update of this screening model in 1998. Included new mitigation estimation component.

The District has been a leader in supporting smart growth and livable communities concepts through its development and dissemination of guidance documents. These documents include land use and site design tools that support strategies that minimize VMT.

The 1994 District publication *Air Quality Guidelines for General Plans* is used by most of the cities and counties when updating general plans, and District staff are available to provide technical assistance upon request. District staff also developed a *Guide for Assessing and Mitigating Air Quality Impacts* that is used by developers and local land use boards and commissions. District staff review more than 1800 project analyses done under the California Environmental Quality Act (CEQA) from local planning agencies each year. The District also led and co-funded a statewide effort by CAPCOA

to update and distribute the *URBEMIS* model, which enables local planners to estimate the emissions impact of land use decisions and develop mitigation measures.

The District has also funded numerous workshops and initiatives of the Local Government Commission (Commission) to work with cities to implement strategies to increase “livability” through increased walking, biking and transit – and thereby reduce air pollutant emissions. Currently the Commission is working with four cities on in-fill projects. Initial analysis indicates that these projects are a cost-effective approach to reduce air pollution.

3. Public Education Programs

The District has extensive public education programs to promote actions to reduce emissions from transportation and areawide sources. Examples of public education and outreach include publication of the District’s monthly newsletter *Valley Air News*, distribution of basic air pollution informational brochures, staff presentations at schools and community events, and development of television and radio spots on actions that individuals can take to reduce air pollution. The District’s *Spare the Air Program* has induced the broadcast media to announce the pollution index and publicize *Spare the Air* activities on days when the ozone standard could be exceeded.

In addition, the District typically holds multiple public scoping meetings and workshops prior to adopting plans, programs and regulations. The District forms advisory work groups to deal with specific source categories for which rules are being developed. The District has a Citizen Advisory Council comprised of elected officials, environmental representatives and agricultural representatives from each of the eight counties in the District. This Council meets monthly to discuss topics of interest and to recommend items for further study to the District.

D. Funding Transportation And Motor Vehicle Emission Reduction Projects

Air districts and transportation agencies have the opportunity to reduce emissions through the cost-effective use of federal and state transportation and mobile source-related air quality funds. The main sources of these funds are:

Federal:

Congestion Mitigation and Air Quality Improvement Program (CMAQ)

State:

Motor Vehicle Registration Fee Program

Carl Moyer Memorial Air Quality Standards Attainment Program

1. CMAQ Program

The 1998 Transportation Equity Act for the 21st Century (TEA-21) is the six-year federal transportation funding bill. CMAQ is part of this Act. The monies are allocated based on a formula that reflects air quality status and population. California law requires that CMAQ funds be apportioned by the California Department of Transportation (Caltrans) directly to the 16 regional transportation agencies.

The Federal Highway Administration's guidance on implementation of CMAQ states that the purpose of the program is to fund transportation projects that will contribute to attainment or maintenance of national ambient air quality standards. ARB, in conjunction with Caltrans and CAPCOA, has developed methods to analyze the cost-effectiveness of CMAQ-funded air quality projects. We periodically distribute these methods to all California transportation agencies. Most transportation agencies, however, have not developed CMAQ project selection criteria that emphasizes air quality cost-effectiveness.

The eight counties in the San Joaquin Valley will receive CMAQ funds totaling \$162 million over the six-year period from 1997-98 through 2003-04, an average of \$27 million per year. Table IV-4 shows how the counties spent CMAQ funds in the 1996-97 and 1997-98 periods -- 53 percent of the Valley's CMAQ expenditures were for traffic management projects such as signal timing. Thirteen percent of the Valley's expenditures were for alternate fueled vehicle purchases, while 17 percent went to transit, bicycle and other transportation demand projects. Most of the remaining 17 percent went to diesel bus purchases; a practice not prohibited by federal law, but clearly not an air quality strategy.

**Table IV-4
Allocation of CMAQ Funds in the San Joaquin Valley by Type of Project**

CMAQ Project category	% of Expenditures 1996-97, 1997-98
Traffic management	53
Alternative fuel vehicles	13
Transit and rail	10
Transportation Demand Management	1
Bicycles	6
Other	17

The San Joaquin Valley is similar to most regions in the State when it comes to its CMAQ expenditures -- the emphasis is on traffic management and congestion relief. But this trend is slowly changing. The District has met with each of the counties to discuss the importance of achieving significant emission reductions through the

allocation of CMAQ funds. The District has also submitted applications for CMAQ funds requesting at least 15 percent of the total allocation from each county for the District's Heavy-Duty Vehicle Emission Reduction Program. Many counties have responded by either aggressively funding alternative fuel vehicles on their own (Kern and Madera) or providing the District with funding (Tulare, Merced, San Joaquin), although not at the 15 percent level.

Table IV-5 illustrates the air quality potential of the CMAQ program, based three levels of cost-effectiveness for projects with a ten-year life. If the annual allocation of \$27 million was used to fund projects that reduced emissions at a cost-effectiveness of \$12,000 per ton, the resulting emission reductions in the sixth year would total 1,350 tons or 3.7 tpd. If the money were used for projects that achieved long-term emission reductions with the current cost-effectiveness of the District's Heavy-Duty Vehicle Program at \$6,000 per ton, the benefits would be even more significant.

**Table IV-5
Emission Reduction Opportunities Based on Cost-Effective CMAQ Projects**

Yearly CMAQ Allocation	Cost-Effectiveness (\$/ton)	Emission Reductions (tpd)
\$27 million	\$20,000	2.2
\$27 million	\$12,000	3.7
\$27 million	\$6,000	7.4

2. Motor Vehicle Registration Fee Program

California air districts have the statutory authority to levy up to a \$4 surcharge on motor vehicle registration fees to be used to fund activities and projects to reduce air pollution from motor vehicles. We have developed criteria and guidelines for the use of the motor vehicle fees and reviews the district programs annually.

The District receives roughly \$8 million per year in motor vehicle fees. Seventy-five percent of the funds have historically been used for direct emission reduction activities, consistent with the statewide trend. Since fiscal year 1994-95, the District has spent over \$7 million on heavy-duty projects. Beginning 1997, the District has averaged about \$2 million per year for its Heavy-Duty Vehicle Emission Reduction Program and another \$2 million per year for its Reduce Motor Vehicle Emissions (REMOVE) program. The REMOVE program supports local transportation control measures and light-duty alternate fuel purchases. The District has been very successful at publicizing these programs and consistently receives applications for more projects than can be funded.

The Heavy-Duty Vehicle Program requires that at least 75 percent of the vehicle miles traveled be within the boundaries of the District and has an air quality cost-effectiveness threshold of \$12,000 per ton. The Heavy-Duty Program projects have been averaging

\$6,000-\$8,000 per ton of emissions reduced. The REMOVE program evaluation criteria are weighted 80 percent toward cost-effectiveness. If the REMOVE funds were as cost-effective as the Heavy-Duty Program, the District could achieve an additional 0.5 tpd of reductions by the sixth year.

3. *Carl Moyer Incentive Program*

As discussed earlier in this chapter, the Carl Moyer program provides incentives through local air districts to cover the incremental cost of cleaner on-road, off-road, marine, and locomotive engines. Project funding may not exceed \$12,000 per ton of emissions reduced. The District received \$4.4 million in 1998-99 from the Moyer Program – these funds must be spent by June 2001. The District has been so successful in promoting the program, it has already received \$6 million worth of applications with an average cost-effectiveness level of \$6,000 per ton.

V. ONGOING RESEARCH AND JOINT ARB/DISTRICT ACTIVITIES

This chapter highlights two major efforts underway which will improve the technical foundation for future ozone air quality planning in the San Joaquin Valley. The first is a comprehensive emission inventory improvement effort (which will also benefit particulate matter planning). The second is the Central California Ozone Study (CCOS) which will provide a better understanding of the nature of the ozone problem across Central and Northern California.

A. Emission Inventory Workgroup

To update and improve the inventory for stationary and mobile sources, the District and ARB formed the San Joaquin Valley Emission Inventory Work Group in 1998. The Work Group is undertaking five tasks as part of this comprehensive effort:

- Improving the data collection process;
- Improving the methods for calculating emissions;
- Enhancing the process for forecasting emissions and control efficiencies;
- Incorporating the updated emissions from the off-road mobile source model into the emissions inventory; and
- Upgrading the transportation modeling process to support on-road mobile source emissions calculations.

These improvements will assist the District in determining rule effectiveness, prioritizing control measures for rulemaking, and identifying additional opportunities for emission reductions. The updated emissions inventory will also be used to identify day-specific source activity during the Summer 2000 CCOS field program.

B. Central California Ozone Study

CCOS is a multi-year study to examine ozone formation and transport in Central and Northern California. It will provide emissions, meteorology, and air quality data for use in grid-based photochemical models to support planning for both the state and federal ozone standards. The CCOS study area encompasses the San Joaquin Valley and surrounding regions, extending from Redding in the north to the Mojave Desert in the south, and from the Pacific Ocean in the west to the Sierra Nevada Mountains in the east. CCOS is being directed by the same public-private committee responsible for the California Regional PM10/PM2.5 Air Quality Study.

The field monitoring portion of CCOS will be conducted during Summer 2000. It will use state-of-the-science technology and monitoring equipment to collect meteorological and air quality data. Much of this data will be collected continuously over the entire summer. However, to gain a better understanding of the dynamics and formation of high ozone concentrations within the region, additional data will be collected for up to 20 days during multi-day ozone episodes. Aircraft and remote sensing instruments will measure special air quality data at the surface and aloft during these episodes.

After the field program is completed in September 2000, a two year effort will commence to validate and analyze the data collected, refine the emission inventory, develop the regional photochemical model, and perform the model simulations needed to develop ozone attainment plans.

VI. STAFF RECOMMENDATIONS

The San Joaquin Valley Unified Air Pollution Control District has made progress in adopting the commitments in the 1994 SIP and the 1994 CCAA plan that have significant emission reductions. The rules adopted or amended since 1994 will reduce ozone precursors by over 27 tons in the 2000-2001 timeframe. These reductions represent about 80 percent of the total commitment in the 1994 SIP for stationary source measures. However, a number of rules were not adopted as scheduled in the 1995-1997 planning cycle. It appears unlikely that such deficiencies will be completely corrected during this current planning cycle. Our analysis also identified several source categories that are currently subject to control at a level less than the all feasible measures requirement of the CCAA. The District will need to make steady progress to fulfill the remaining commitments and ensure that all feasible measures are in place.

As discussed in detail in Chapter III, the District has appropriately identified the 1994 SIP commitments as the highest priority. Besides the avoidance of potential federal sanctions, the commitments made in the District's 1994 Ozone SIP have the potential for significant emission reductions. The District also needs to address the 1994 CCAA-only commitments and measures for the source categories where ARB has identified the current requirements as less than all feasible measures as the next priority. The District should identify the inventory, potential reductions, and priority for rulemaking in the next CCAA triennial plan revision and commit to adopt at least four of these measures per year in the 2001-2003 planning cycle. These measures are also likely to be needed to demonstrate attainment of the federal one-hour ozone standard by 2005 in the bump-up SIP expected in 2001. The District could remove measures from the rulemaking list if the District demonstrates that a measure is not technically feasible, not cost-effective, or the emission inventory does not justify rulemaking.

Recommendations for Conditional Approval. ARB staff recommends that the Board conditionally approve the San Joaquin Valley Unified Air Pollution Control District's Triennial Progress Report and Plan Revision for 1995-1997. If the Executive Officer determines that the District has fulfilled these conditions, the conditional approval would become a full approval. If the Executive Officer determines that the District has failed to meet these conditions in the specified timeframes, the conditional approval would revert to a disapproval. The recommended conditions follow:

1. That the District adopt the following measures as soon as possible, but no later than the end of 2000, for purposes of the California Clean Air Act. Measures from the list below may be deleted if the District demonstrates that a measure is not technically feasible, not cost-effective, or the emission inventory does not justify rulemaking.
 - Amendment to Rule 4601 – Architectural Coatings
 - Amendment to Rule 4662 – Organic Solvent Degreasing Operations
 - Amendment to Rule 4661 – Organic Solvent
 - Amendment to Rule 4623 – Organic Liquid Storage

- Proposed New Rule (4411) – Well Cellars
 - Proposed New Rule (4692) – Commercial Charbroiling
 - Proposed New Rule (4663) – Organic Solvent Waste
 - Amendment to Rule 4103 – Open Burning
2. That the District prioritize the following measures and adopt at least four of these measures per year in the next planning cycle (2001-2003) to achieve emission reductions. Measures from the list below may be deleted if the District demonstrates that a measure is not technically feasible, not cost-effective, or the emission inventory does not justify rulemaking.
- Proposed New Rule (4410) -- Gas Plant Glycol Regenerators
 - Proposed New Rule (4627) -- Tank Cleaning and Venting
 - Proposed New Rule (4307) or Amendment to Rule 4305 -- Dryers (as BARCT)
 - Amendment to Rule 4305 -- Boilers, Process Heaters, Steam Generators
 - Amendment to Rule 4701 – Stationary and Portable Piston Engines
 - Amendment to Rule 4403 -- Components Serving Gas Production Facilities
 - Amendment to Rule 4451 -- Valves, Pressure Relief Valves, Flanges, Threaded Connections and Process Drains at Petroleum Refineries and Chemical Plants
 - Amendment to Rule 4452 -- Pump and Compressor Seals at Light Crude Oil and Gases Production Facilities & Components at Natural Gas Processing Facilities
 - Amendment to Rule 4703 -- Stationary Gas Turbines
 - New Rule for Bakery Ovens
 - Proposed New Rule (4409) -- Discharge of Produced Oil/Flashing Losses
 - Proposed New Rule (4408) -- Oil Pipeline Pumping Fugitives
 - Proposed New Rule (4308) -- Asphalt Batch Plants & Hot Mix Asphalt Batch Plant Fugitives
 - Proposed New Rule (4643) -- Publicly Owned Water Treatment Works
 - Amendment to Rule 4653 -- Adhesives
 - Amendment to Rule 4602 -- Automotive Refinishing
 - New Rule for Pleasure Craft Coating
 - Amendment to Rule 4682 -- Polystyrene Foam Manufacturing
3. That the District revise its cost-effectiveness thresholds to reflect the current range of cost-effectiveness thresholds in place in other districts with similar air quality problems and to enable the District to comply with the all feasible measures requirement.
4. That the next CCAA plan revision identify the specific calendar year proposed for adoption and implementation of each commitment, along with an estimate of the expected emission reductions.
5. That beginning in 2000, the District submit annual reports containing the proposed and actual dates for the adoption and implementation of each measure scheduled for that year, pursuant to H&SC section 40924(a).